Gleanings in Bee Culture

Established 1873

April, 1956 Vol. 84, No. 4

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Subscription Rates: United States, Canada, Pan American countries, and Spain, one year, $2.00; two years for $3.50; three years for $5.00. Single copy, 20c. Other countries, 50c per year additional for postage. Discontinuance: Subscription stopped on expiration. No subscriber will be run into debt by us for this journal. Change of Address: Give your old address as well as the new and write the name to which the journal has heretofore been addressed. Remittance should be sent by post office money order, bank draft, express money order or check. Contributions to Gleanings columns solicited; stamps should be enclosed to insure return of manuscript to author if not printed. Advertising Rates: Advertising rates and conditions will be sent on request. Results from advertising in this journal are remarkably satisfactory. Advertisers' Reliability: While the publishers do not guarantee advertisements in this journal, they use utmost diligence to establish in advance the reliability of every advertiser using space in this journal.

Entered as second class matter at Post Office at Medina, Ohio. Published monthly. Opinions expressed by the writers in these columns are not necessarily the opinions of the editors.

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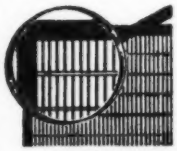

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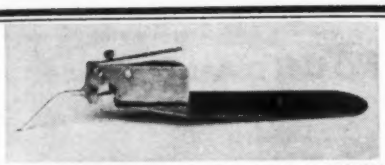

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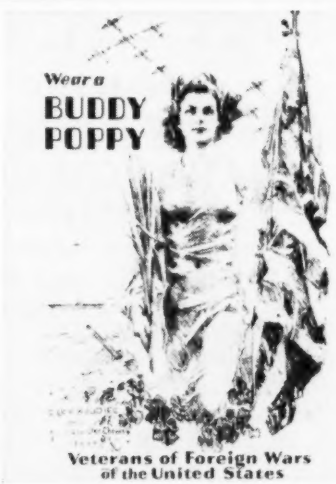

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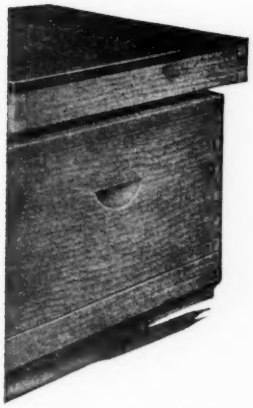

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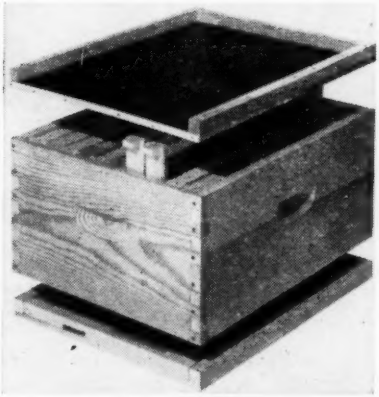

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SYNTHETIC BEE HIVES

A New Idea by
DR. ING. O. RAUDSZUS*
Ruhmannsfelden-Niederbayern, West Germany
Translated by Erika Barth

New plastic beehive offers insulation, non-warping, non-rotting, and light weight. No painting necessary.

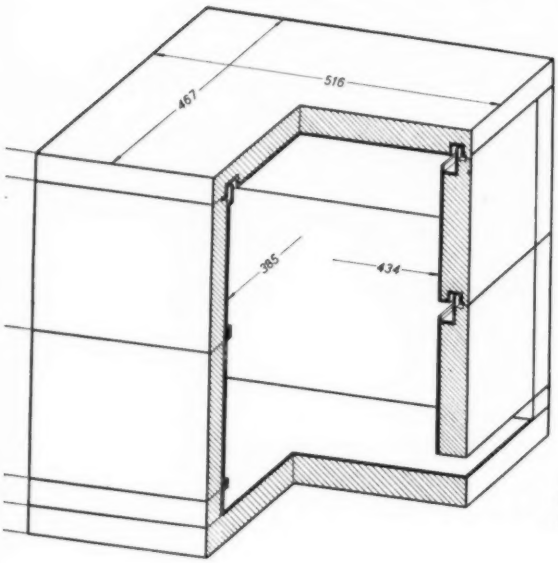
WOOD HAS always been the main material from which hives are built. Surely it is more suitable for this purpose than any other material, although one must admit that it also has considerable disadvantages.

The lack of insulation is a big disadvantage. This is a good feature as long as the wood is dry, however, as soon as it becomes wet, which happens very fast even during normal weather, the insulation becomes quite a bit cooler. One tries to make up for its lack by building double walls and filling the space with insulating material, but the insulating material in the hollow spaces also becomes damp. The absorbed water freezes during the cold, and so it happens that the bees sit in their hives like in a box of ice. The dampness hits the cold walls around the bee cluster which starts the development of fungus growth. A short warming-up during the noon hours cannot penetrate to the bee cluster. This hinders the development of the colonies considerably in the spring.

Beehives of wood must always be taken care of if they are to fill their purpose as beehives. In Germany they must also be placed in bee houses to

Single cells of foam plastic used in the manufacture of new bee hives.

*See Editorial page.



A diagrammatic cut-a-way illustration of the new plastic hive developed by the author, Dr. Ing. O. Raudszus.

protect them against inclement weather. Because of this, beekeeping is very expensive and many do not even begin, because they cannot afford to build even the simplest bee house.

For several years now, the chemical industry has been producing artificial foam material which might become a very suitable substance for beehives. This material has much better insulating value than wood. It is extremely moisture resistant. The weight of this material is only a tenth of that of wood. Foam plastic can be easily shaped. The forms can easily be retouched, if necessary. A warping of the material, a very troublesome characteristic of wood, does not occur.

The material consists of an artificial substance, e.g., polystyral or polyvinylchlorid to which a gas generating substance has been added. The material inflates under the influence of heat. When poured into forms it is filled completely by the inflated particles which adhere to each other tightly. One gets thick slabs or forms which are made up of many single cells in which air is locked.

Illustration (pg. 201) shows the single cells of the foam plastic styropor enlarged 100 times. One can plainly see the single cells in which air is locked. The cells are from 0.2 mm to 1 mm in diameter according to the closeness of the material.

A constructed hive made of foam plastic is shown in illustration above. The hive in question is a leaf or magazine hive with frames in Zander measurements.

No complete dies have been made for the sample hive. However, with them one could manufacture the complete hive in one operation within 30 minutes. Such a die is quite expensive and the manufacture or procurement would only make itself profitable when a large number of hives would be manufactured. The sample hives were therefore constructed of single slabs which were swelled in plain dies. These slabs were then sawed with a circular saw, matched, and glued with "cold glue". The inside walls of the hives were covered with a hard coating of plastic to make an easy cleaning of the hive possible.

Two hives were set on an iron square which made it possible to lift both hives together and that would be very advantageous when moving colonies. The hive consisting of brood chamber, top, and bottom boards weighs without frames and bees, approximately 2.4 kilograms (4½ pounds approximately),

New Raudszus plastic foam synthetic bee hives ready for winter. Due to the insulating value of the foam plastic it may be unnecessary to use winter packing in Germany.

with a super about 3.3 kilograms (6½ pounds approximately). Two supers can therefore be very easily handled. Here is the manufacturer of these plastic hives: Badische Anilin - u. Sodafabrik, Ludwigshafen (Germany).

Since spring of 1955 the first experiments have been made with the foam plastic hive and they have been very impressive. Three and five-frame nuclei can easily be developed into an eight-frame unit.

On especially hot days, when bees were at the openings of wooden hives, trying to ventilate the hive, only a few bees were to be seen at the opening of the foam plastic hive.

Illustration above shows foam plastic hives ready for winter. The hives do not have to be too well packed, because the insulation will be good enough without proper packing. The experience gathered during the winter will give us valuable information on the final shape we will decide upon.

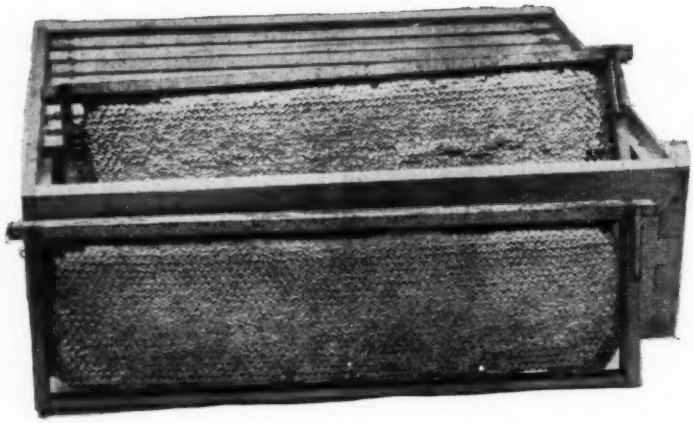
Comparisons between wooden and foam plastic hives on insulation and dampness are to be made and also experiments conducted as to bee behavior in the new hive.

It can be assumed that the choice of the new hive material will have quite a few direct and indirect advantages for beekeepers and bees. Besides the low price later, which could be even less if the beekeeper manufactures them himself, there will be a lesser honey consumption during the winter and also especially in spring and summer due to the good insulation. Dampness on cold walls in the inside of the hive are improbable, and it is therefore easily possible to put the coldest spot near the hive entrance. A winter packing is probably unnecessary since a 40 mm thick slab gives more insulation than a wooden double-walled hive which in addition is in a very sheltered place.

A warping of the material is impossible. Parasites find no breeding place since cracks and crevices do not appear. Because double walls filled with insulating materials are no longer needed and other breeding places for parasites have been eliminated, it is not necessary to paint the hive. The material resists all kinds of weather. It does not rot and can be left out of

(Continued on page 246)

CHUNK
Honey Production



As Told by
Lee Stewart

ROUGHLY SPEAKING honey production can be divided into three periods, or eras. From the beginning of time until 1865 comb honey was the principal product, consumed just as the bees made it. During most of this time honey and maple sugar were the only sweetening agents known. In ancient times some honey was "squeezed" out of the combs and strained for the treatment of ulcers and wounds and in later years of the period larger amounts were squeezed out for table use.

The discovery of the principle of centrifugal force for extracting honey from the comb by Major D. Hruschka of Venice in 1865 inaugurated a new era in honey production, and comb honey has been slowly fading from the picture. The third period has not as yet jelled but chunk honey, a refined version of the early days of the first period, is becoming more popular each succeeding year. It probably will never dominate the period as too much extracted is being used commercially; however enough chunk will be produced and used to lend color to the period of today.

Likewise section comb, the educated product of the early period, will still be produced but in lesser quantities. These changes in honey types did not come about due to the whims of appetites so much as they did to economic conditions, agricultural practices, and changes in soil structure.

Anyway the child of today is chunk honey and its production is not so simple as some supply dealers would have you think. In the first place quality chunk honey production requires all the technique necessary for good section comb honey. To produce a good grade of chunk you must be in a territory that affords a good yield in a rapid flow. A colony wont produce as much chunk as it would extracted. And subsidized agriculture is playing havoc with honey production, especially comb honey.

Some preparation for chunk honey production should be made the previous fall. This will include a large force of young bees with a good queen and ample stores of honey and pollen, which means much more than just enough for wintering. Colonies that do not propolize or build burr combs

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excessively should also be marked. Each territory has its own peculiar problems which must be considered in any good beekeeping. We have enough early sources of nectar to take care of all our build-up requirements but as adverse weather can nullify them all, we leave enough stores on in the fall for our main flow build-up. If we get a favorable break in the weather we will have to either remove honey in the early summer or give more brood room, either of which is much easier and more satisfactory than feeding in inclement weather. As to stores it is always well to remember the old saying, "millions of honey".

As before stated non-propolizing bees that do not build burr or brace combs and are white cappers should be selected for chunk honey production. Such bees are not difficult to select, if you have any; but certain strains just wont do for comb honey of any kind. Our pre-flow routine is the same as for any production, namely, to get our colonies as populous as possible. Two brood chambers of bees is an ordinary colony; those of three and four are your chunk honey colonies. The queen must be vigorous which means in most cases she must also be young. If she is not vigorous her brood will not be able to use the pollen gathered and some of it will be stored in your supers. Old queens also have a tendency to lay in supers especially if there should be any drone cells.

Shortly after the honey flow gets under way we reduce our colonies to two brood chambers or one brood and a shallow super. All the sealed and hatching brood is placed in these two bodies with the queen, the bottom one being filled first. If there is not enough brood to fill out the top body, pollen frames and empty combs are used. The bees are shaken from the remainder of combs and this equipment which includes the unsealed brood is given to some colony which is to be operated for extracted honey.

If we should want increase we leave enough bees on combs to take care of the brood, stack three or four bodies on a new stand, give them a queen and in a short time we will have a strong colony. In order not to lose any young bees we shake on the top of the frames. At this point chunk honey operations differ slightly from section honey; in the latter we reduce to one brood chamber as the bees must be forced into the supers and queens seldom enter sections. But in chunk production it is different so we must give the queen plenty of room below our supers. A rim of honey along the top bars in the top brood chamber also serves as a check on a wandering queen unless she is an old one. Queens are like humans, the older we get the more we like to gad about.

As we have some minor sources of nectar at the beginning of the clover flow we like to give a shallow extracting super at the start to catch these off color honeys. This also serves more or less as bait sections do in a section super. In a few days, depending upon the rapidity of the flow, we give our first chunk super, placing it under the extracting super. When this is well drawn we add another, putting it under the other two. As soon as the bees finish the extracting super it should be removed in order to keep your chunk nice and white. We try to get it extracted and have ready to catch the tail end of the flow.

Chunk honey supers should be added only as needed. The end of the flow should be determined in order not to over-super and get them all finished. Sometimes the bees are slow finishing outside combs so in order to get them completed we interchange them with full ones.

Supers equipped with follower boards as in the T section super will not have any unfinished frames; all frames will be drawn and filled simultaneously. In very hot weather or in territories that produce a lot of propolis, finished supers should be promptly removed. We remove with bee escapes as any loose or broken honey is cleaned up. If it is extremely hot, shade of some kind should be provided in order to keep your cappings from melting and becoming soaked. Some regular covers will afford enough protection; others will not. Bees do not give too much attention to the finished supers and we have had them melt down. Some beekeepers stagger supers but this only interferes with the bees' system of ventilation. Finished supers are stacked criss cross in the honey

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house until cooled out and then stacked and treated for wax moth until used or sold.

Chunk honey supers should be painted a different color from other supers so they can be easily spotted and none overlooked. Ours are painted yellow since that is our favorite color. The frame is important. We have tried the split top bar, the grooved top bar and the heavy top bar with split bottom bars. It's difficult to get foundation straight in a split top bar which results in a crooked frame of honey. A thick top bar is easily fixed but does not cut economically for most packs. So we use the regular shallow extracting frame (5⅜ inch) with grooved top bar. Full sheets of standard chunk comb foundation extending to within ¼ or ⅜ of an inch to the bottom bar and waxed in are used. We formerly used full sheets extending through split bottom bars; but the bees would fasten the bottom and the heat of the hive and the weight of the bees on the foundation would stretch it and give us a warped comb.

We have also tried two-inch starters but the bees would start at the back and build forward, all cells being drone cells which not only made a rough, unattractive comb but was also an invitation to the queen to lay eggs in the drone cells. Such combs were too often accepted. We use a full complement of frames in our supers as we sell most of our crop to packers as they don't want a comb too fat. If follower boards are used as in a T super you will have one frame less but you will get a nicer and more evenly finished comb. Exchanging frames will not be necessary as all of them will be worked simultaneously. Often bees will work the back part of the super first as this is where working conditions are the best. If they do, we reverse the super when a new one is given.

We are learning more about chunk honey production each season and as we have a long ways to go we often wonder if there is enough time yet remaining. Quite often the bright idea of today looks silly on the morrow; but that's education and progress. You can readily see chunk honey production is not for the let-alone beekeeper and definitely not for the one who sees his bees only in the spring, at supering time, and at harvest time. Fancy chunk honey production is as much the work of specialists as is fancy section comb.

Eastern Apicultural Society to Meet

Reports W. K. DAVIS, Publicity Director

ADVANCED REGISTRATION is now in progress for the big event—the 1956 conference of the Eastern Apicultural Society which will be held at the University of Rhode Island, Kingston, R. I., July 13-15. The University of Rhode Island is truly an ideal spot for such a conference with its expansive campus and modern facilities.

Anyone planning a visit to the New England States shouldn't pass up this opportunity to make the conference a part of their vacation plans. The site of the conference is located adjacent to the shore resort area and it affords an opportunity for excellent salt water fishing and sports such as surf-bathing, swimming and boating on Narragansett Bay.

The program committee is busily squaring away details of the conference and is trying to put together the most attractive program that has ever been devoted to the needs of the hobbyist and small operator. There will also be opportunities for apiary inspection personnel, teachers and supply and dealer personnel to talk over their problems at informal sessions.

Information relative to registration and the program may be obtained by writing Mrs. Kenneth Manchester, secretary-treasurer, RFD 2, Middlebury, Vermont or Mr. J. Gaston Levitre, president, 269 Great Road, Union Village, North Smithfield, R. I.

Here Are Some Management Tips by C. L. Farrar* on

TREATING bee diseases

Treatment via bulk sirup feeding, dusting, spraying brood or mixing with pollen supplement.

THE USE of medicinal agents in the treatment of bee diseases has become common procedure in the last 10 years. The bee diseases take a heavy toll of the industry's resources, and beekeepers can ill afford to deal lightly with disease problems.

We cannot assume that a drug that gives control this year will be equally effective in all years to come. It is well known that some strains of pathogenic organisms tolerate drugs that have been active against the more common forms. The use of a drug reduces the chance of such strains developing by cutting down the number of susceptible pathogens that can multiply in the bee. One **Bacillus larvae** spore that gains entrance to a bee larva of the proper age under the right conditions may be multiplied two to three billion times in eight or nine days. Preventive treatment of colonies in apiaries or areas when there is a potential disease problem is sound both in theory and in practice.

When disease is already present, the beekeeper must be certain of its identity, know its manner of spread, and know the specific drug that is effective in its control. Then he should use only the prescribed dosage under recommended conditions and the proper method of application.

Apparently none of the medicinal agents now in use have direct disinfecting activity. Since their effectiveness seems to be in inhibiting growth of the pathogens within the bee, they must be administered in some manner that insures their ingestion along with the bee's normal food. This paper summarizes the various treatments in current use and presents recommendations of methods that have proved effective at the North Central States Beekeeping Laboratory at Madison, Wisconsin.

Currently Used Medicinal Agents

Sulfathiazole is specific against American foulbrood, being ineffective against any of the other bee diseases. Sodium sulfathiazole is preferred, since it is about 680 times more soluble in water than plain sulfathiazole. Dosages of 0.5 to 1 gram per gallon of sirup have been used satisfactorily. Higher dosages have indicated toxicity to the colony and should not be used. The dosage required to give control and avoid toxicity depends on the manner in which it is administered. Sulfathiazole is not subject to deterioration.

There are several other sulfa drugs more widely used in medicine than sulfathiazole that are effective against American foulbrood. Sulfacetamide may be the exception, as tests at the Intermountain States Beekeeping Laboratory at Laramie, Wyo., showed it to be ineffective.

* Entomology Research Branch, Agricultural Research Service, U. S. Department of Agriculture. In cooperation with the Wisconsin Agriculture Experiment Station.

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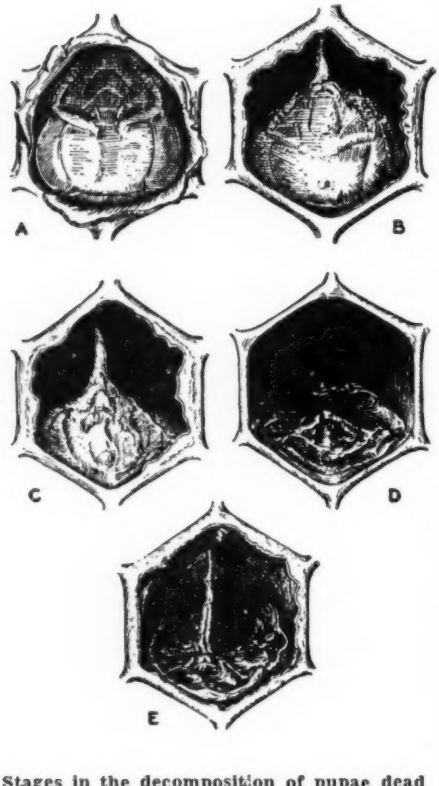
Streptomycin sulfate and dihydrostreptomycin sulfate are highly effective against European foulbrood. Both materials are water-soluble, fairly stable, and apparently nontoxic to the colony. Minimum dosages of these antibiotics have not been determined because of differences in the percentage of active streptomycin and methods of application used by various workers. Dosages of 0.2 to 0.6 gram per gallon of sirup have been recommended.

Terramycin, another antibiotic, has been recommended principally for use against European foulbrood, but it is reported to be active also against American foulbrood. It is available commercially in a product called Terracon - TM-5, TM-10, and TM-25, the figures indicating the grams of terramycin per pound. Terracon generally is mixed with powdered sugar and used as a dust, as it is quite stable in dry form but deteriorates rapidly in solution. Weekly applications of 0.1 to 0.2 gram of active terramycin per colony appear to give good control of European foulbrood. To administer these dosages, use 20 to 40 grams per colony of one of the following mixtures: 1 pound of TM-5 to 1 pound of powdered sugar; 1 pound of TM-10 to 3 pounds; or ½ pound of TM-25 to 4 pounds.



Stages in the decomposition of pupae dead of American foulbrood: A, B, C, heads of pupae showing progressive stages of melting down and decay. In B and C the tongues show prominently. D, scale of American foulbrood formed from the drying down of a diseased pupa. E, scale of American foulbrood formed from the drying down of a diseased pupa with a vestige of the tongue adhering to the roof of the cell. — From Government Bulletin, Department of Agriculture, No. 1713.

The antibiotic fumagillin is specific against the protozoan causing Nosema disease in bees. Fumagillin is fairly stable and nontoxic to the bees within the dosage limits required for Nosema control. For practical control feed 75 to 100 mg. per gallon of 2:1 sugar sirup in such quantity as to provide the principal food requirements of the bees continuously for at least three weeks. The trade product Fumidil B contains a soluble salt of fumagillin with added buffering salts to increase its stability. One gram of Fumidil B powder contains 50 mg. of active fumagillin, thus 2 grams are needed to provide 100 mg. for each gallon of sirup.

Methods of Treatment

The sulfa drugs and antibiotics have been most commonly fed in bulk sirup. Bulk feeding is satisfactory for small colonies in one-story hives or packages or in the feeding of fumagillin, which requires a long period of treatment. Colonies that occupy several hive bodies tend to store sirup just below the feeder. Thus, this method of feeding does not insure immediate use of the treated sirup in brood rearing, which is necessary to eliminate the disease. There is also danger of its being carried into the supers and removed with the surplus honey. Sirup fed in bulk feeders may result in some reduction in disease but not always complete eradication.

Dusting the tops of the frames with a sulfa drug or antibiotic mixed with powdered sugar is widely used because it requires a minimum of labor and apparently has given good results.

However, a method that requires only the lifting of the hive cover and making a few shakes with a duster may cause the careless operator to become overconfident and neglect all inspection. The dusting method provides little control over the dosage received by each bee. Poor dosage control can injure the colony when a toxic substance such as sulfa is used, and the method is costly when the more expensive antibiotics are used. The relatively cheap terramycin products probably are best suited for dust applications. In large colonies good distribution of the medicinal agent is more likely to be obtained where the dust is applied to the top bars of all brood chambers than when it is fed in sirup supplied from bulk feeders.

Spraying the brood may permit some of the nurse bees to obtain traces of the drug, but the quantity that can be supplied at concentrations nontoxic to the bees is too limited for practical use.

The most effective method of application is to spray or sprinkle all the bees in the hive until they become gorged with the medicated sirup. If the bees are thoroughly wet with the maximum amount that will not run out of the hive, they will become gorged with the sirup as they clean each other. With all the bees gorged at one time, the treated sirup will be distributed throughout the brood nest, where it will be consumed immediately.

The addition of one or more of these materials to the sirup used in mixing cakes of pollen supplement (trapped pollen and soy flour) has theoretical merit in disease prevention. Pollen supplement is eaten principally by the young bees just emerging and the nurse bees engaged in the feeding of brood.

Sulfathiazole, streptomycin, and fumagillin have been added to the pollen supplement fed at the Madison laboratory, with apparently beneficial results. Only with fumagillin has this method been tested on inoculated colonies to provide positive evidence that it will control Nosema disease (378 mg. per gallon of sirup or 46 mg. in 2 pounds of supplement).

At Madison we have not fed sulfathiazole or streptomycin in pollen supplement to colonies showing active American or European foulbrood.

Left: Normal stomach of honeybee. Right: stomach of honeybee infected with Nosema Apis. Both stomachs magnified 10 times.

However, one apiary in 1947 and another in 1952 showed a high percentage of colonies in an early stage of American foulbrood infection. The infection in both apiaries was brought under control by gorging the bees three times with sprays of sulfa sirup or sulfa in water. (We have used a water spray successfully but prefer the sirup.) In subsequent years each colony has received about 10 pounds of pollen supplement containing 0.6 gram of sodium sulfathiazole (1 gram per gallon of sirup used in preparation) between March 1 and April 15. Since the initial outbreaks not a single cell of disease has been observed in either apiary.

In assessing the value of such preventive treatment, there is, of course, no basis for concluding that a latent infection persisted in the colonies following the spray treatment or that an outside source of infection was still available to the bees. Proof of effective preventive treatment would require continuous contamination from the outside sources or controlled inoculations of the colonies.

Streptomycin fed in pollen supplement as a preventive treatment was used first in 1954. The incidence of European foulbrood infection in that year was slight, whereas it was epidemic in the two previous seasons. Except for a few untreated controls, during the last three years all known cases of European foulbrood were cleaned up within 10 days with spray applications of streptomycin in sirup.

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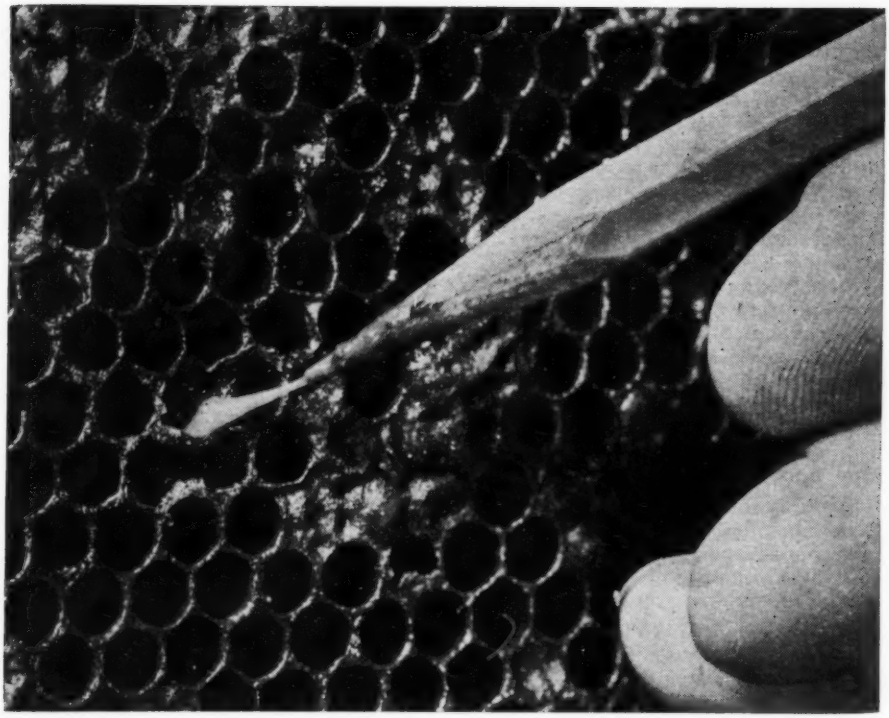

Sure proof of American foulbrood is the ropy characteristics of the larva as shown above. The diseased material will snap back when stretched too far. A Gleanings photo.

Recommendations

In order to deal effectively with disease problems, the operator must know the characteristics of each disease so that he can make a correct diagnosis. He should use one of these drugs only in the apiaries or areas known to need them. He must make frequent inspections for disease regardless of the confidence he has in the preventive or control treatments used.

Official inspection should be encouraged and official regulations willingly complied with when disease is found by the State inspector. The presence of disease is evidence that satisfactory control measures have not been carried out. Even though one's personal experience or that of others indicates that the colony and equipment might be saved by use of a therapeutic, it is worth more to know that the control laws are enforced efficiently and without bias than to save equipment or argue that the law is wrong. We can more safely defer to the future any decision affecting community control of bee diseases by changes in laws.

The existing State laws affecting disease control, particularly the eradication of American foulbrood, seem to be fundamentally sound. Efficient State inspection and control will aid rather than hamper beekeepers who apply sound therapeutic measures, for it will eliminate sources of reinfection.

It is wise not to exchange equipment from yards where drugs are employed with those having no record of disease for two or three years after the last use of a drug. This is especially true of American foulbrood.

An occasional colony infected with American foulbrood should be burned. As a preventive measure, all remaining colonies should be sprayed or sprinkled with 25 to 40 per cent sugar sirup containing one gram of sodium sulfathiazole per gallon. Two or three treatments three or four days apart will provide a margin of safety greater than a single treatment.

Sometimes a serious outbreak of American foulbrood develops in an apiary having no previous record of disease. Frequent inspection usually permits discovery of an outbreak when the colonies show only a few diseased cells. Under such conditions, but with knowledge and approval of the State apiarist, the sulfa treatment described above can be used. Three applications of the treated sugar sirup should be made to all colonies in the yard within 10 to 12 days. Any colony that shows evidence of disease after approximately two weeks should be burned.

Typically, American foulbrood develops slowly in most colonies. Under unusual circumstances, a colony that shows one to ten cells when first discovered may show several thousand a few days later. Such a colony probably cannot be freed of disease promptly and should be burned, although at the Madison laboratory we have eliminated disease experimentally from two such colonies by continued treatment for four to six weeks. The labor required plus unknown risk factors to one in business would be greater than the value of the colony and equipment.

Continued treatment is feasible as long as there is evidence of infection in the area. As indicated previously, sulfa in pollen supplement (one gram per gallon of sirup) probably is effective. Sulfa can also be added to pollen substitutes, but it may give less protection because the substitutes are consumed in less quantity and more slowly than the supplement. Spray treatments can be used in place of treated pollen supplement. They should be applied as early in the spring as the temperature will permit the bees to clean up the sirup quickly, usually about the time the first pollen is gathered. When no active disease has been found in the area for two years, further preventive treatment may be unnecessary although frequent inspection should be continued.

European foulbrood may show up suddenly at any time between early April and September, though most frequently in May or June. The most virulent cases may kill 50 to 75 per cent of the unsealed brood in less than a week. Colonies that show only a few infected unsealed larvae or larvae that died after sealing may lose considerable brood, as evidenced by reduction in brood quality. The loss of brood may still seriously affect the colony strength even though the bees are removing the evidence of disease.

Spray or sprinkle the colonies to gorge the bees with 25 to 40 per cent sugar sirup containing 0.6 gram of streptomycin sulfate per gallon until all evidence of disease has disappeared. Three applications three or four days apart have been sufficient to eliminate the most severe infections for the remainder of the season. In apiaries where European foulbrood was prevalent the previous year, the addition of streptomycin to pollen supplement or by spray applications in April or early May may be desirable.

To gorge bees by spray application, tip the hive over backwards to a horizontal position, return the bottom board and the first brood chamber to their original position, and direct the spray down into the interspaces until all bees are wet. Repeat the application for each set of combs as you reassemble the hive. Use the maximum amount that will not run out the entrance—one pint to two quarts, depending upon the size of the colony. Use a tank sprayer equipped with a coarse nozzle that will deliver about a pint of liquid per minute. A mist sprayer will not deliver a sufficient volume quickly. A power sprayer is satisfactory for large apiary operations. By tipping the hives over, you can spray a three-story standard or a four- or five-story shallow hive in about two minutes.

Colonies having a great density of bees can be treated with good results by pouring the sirup over the top brood frames with a sprinkler. This method offers less control over the volume of sirup administered, but when all colonies are treated quickly and at the same time, the small amount of sirup that may run out the entrance will not cause robbing. Pour half the amount of sirup required (10 gallons for 40 three-story hives) over the bees and combs as you remove the covers. Leave the covers off until the last colony has been treated; then return to the first colony and add the remaining sirup and replace the covers.

The medicinal agents used in disease control should be weighed rather than

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Photo by
D. S. Vandeputte

What The Honeybee Brings Home In Its Baskets

As Told by
CHARLES W. GOUGET

DURING THE balmy days of late March or early April a low buzzing hum like the drone of a distant airplane may call our attention to hundreds of honeybees "swarming" about the pussywillow trees of the neighborhood. To the uninitiated this apparent confusion may mean a swarm, but to the experienced beekeeper it means that the bees are again filling their "baskets" with pollen to replenish the stores used up during the winter.

Closer observation around the pussywillow buds will reveal a most interesting phenomenon. The bees appear to be on a lark, and what seems to be wild confusion in the air turns out to be a happy frolic on the pussywillow buds. Large numbers of bees hang suspended in the air around each bud as if to affect a gyroscopic landing. Bees on the buds clamor over one another with great excitement intent on obtaining choice bits of the "golden nuggets" (pollen) scattered over the pussywillow bud.

In their excitement many lose their footing and appear to tumble purposely as if to try to roll in their precious find. Others hang almost motionless on twigs and branches combing the yellow powder (pollen) from the hairs on their bodies with their middle pair of legs. At times they too glide out into space, hang suspended in the air, and rub their hind legs together much in the same way as one may dust off one's hands. These bees are in the process of filling their baskets with pollen.

The hairs on the body of the insect act as pollen catchers while the hairs on the inside of the legs are used as combs to remove the pollen "powder" from its body. By a clever series of manipulations with the "combs" the pollen is worked from the body to the legs, and from one leg to another until it accumulates in the pollen baskets of the hind legs. The pollen baskets of the honeybee are cup-like depressions located at the joint between the two large segments of the hind legs called the tibia and the basitarsus. The movement of the joint back and forth helps to pack the "baskets" potato-masher fashion until a small pollen pellett accumulates under the hairs around the joint. The load is then ready for the "beeline" back to the hive.

At the hive entrance the pollen-gatherers land in rapid succession and waddle quickly into the hive in a constant stream as if they were anxious to get rid of their heavy loads. As each gatherer lands others leave the hive simultaneously for another load. Those leaving the hive appear to be in such a rush that some skid out upside down and land on their backs before they are able to right themselves and take off.

Those entering the hive with the pollen load scamper up the inside of the hive on to empty combs. Each hurriedly investigates several cells by placing its head inside, and then for no apparent reason each one will select a cell in which to deposit the pollen pellets. At this point it straddles the cell grasping the edges with the front legs, and arching its abdomen so as to rest on the opposite edge while the hind legs dangle in the empty cell. With a quick movement of the middle pair of legs the pollen pellets are kicked off the hind legs and drop to the bottom of the comb cell. The bee then walks away unconcerned, and pays no further attention to its deposit.

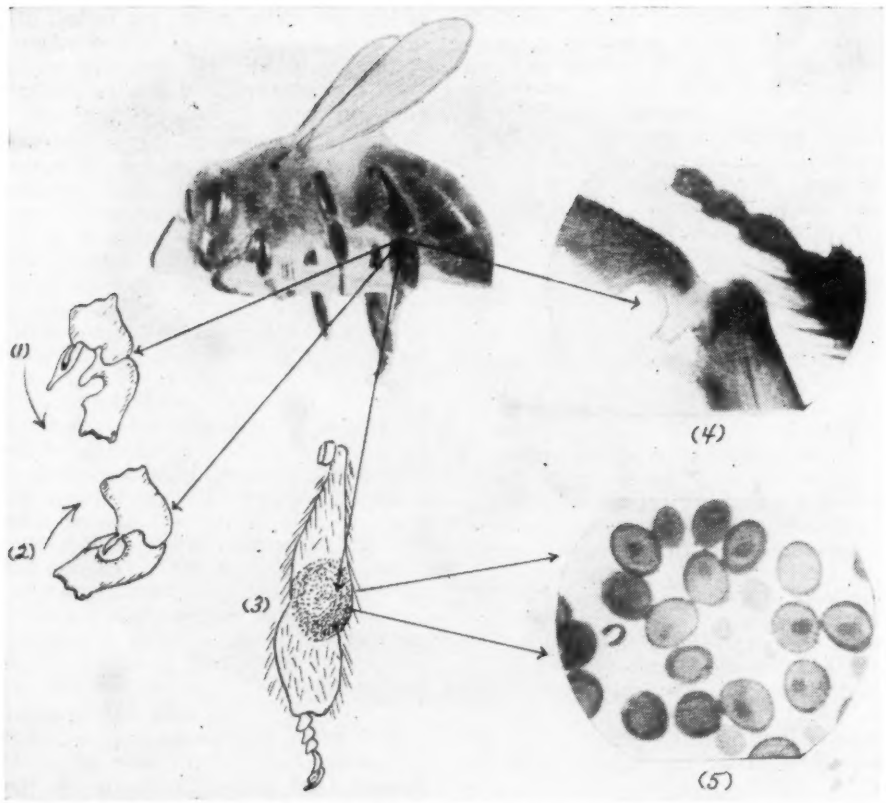
Almost as soon as the pellets are deposited so-called nurse bees or house bees enter the cell and break up the pellets with their mandibles (horny jaws) and pack them in the base of the cell. It is supposed that the packing may be done partly by using the head as a ramrod. Also, in the process of chewing up the pollen it is quite possible that other substances may be added to the pollen such as enzymes, sugar, or both. The resulting product we choose to call bee bread. Peculiar as it may seem a comb cell is never completely filled with pollen and capped over with wax. Instead, it is always only partially filled with pollen, and the remainder completed with honey before it is capped over. This is the honeybees' method of preserving pollen for later use, and involves the same principle as that used in preserving peaches or other fruits in heavy syrups for home use.

The food of the honeybee consists largely of nectar, a sweet juice secreted by nectar glands at the base of many flowers, and pollen produced by the anthers of the flower. Nectar in a concentrated form is called honey, and the mixture of pollen and honey stored in the cells is known as bee bread. These two substances make up the essential foods for a "balanced" diet for the adult bee and the young. Honey provides the carbohydrate food, and pollen provides protein and vitamins.

Other things often enter into the diet of the bee such as the juices of injured fruit, the exudations of trees, and the honeydew that accumulates on some hairy leaves in the early morning. Bees are often found around flour, chicken mash, and even fine sawdust, a fact that may indicate that they may use some of these substances in place of natural pollen when pollen is scarce. The fact that most beekeepers now feed soybean flour to bees as a pollen substitute helps to support this assumption.

The Pollen Dance

The fact that bees accumulate in such large numbers around a source of food in a very short space of time



FILLING THE POLLEN BASKETS—(1 and 2) The potato-masher action of the joint for packing pollen in the "basket" is much like flexing the elbow. (3) A pollen basket completely filled with pollen. (4) A photomicrograph of the leg joint containing the pollen basket. (5) Pollen grains greatly magnified — what the honeybee brings home in its baskets.

would lead one to suppose that bees have some means of transmitting the idea from one member of the colony to another. Although the source of the find may be a great distance from the hive the first scout to find the food will gradually be joined by more and more bees until the numbers may reach the proportions of a swarm.

The first scouts who discover a lucrative source of food such as pollen return to the hive to spread the news. After each scout has disposed of its load of pollen it goes into a dance. It turns first to the right, then quickly to the left, then it runs quickly in a semicircle, repeats the first antics and then completes the circle. The same performance may be repeated over and over with slight variations until a small group of bees may be attracted to the dance and led back to the source of food. In a like manner they too return to dance for more converts until the "trek" for food has been multiplied many fold.

Pollination

We are beginning to realize more and more every year that the greatest benefit we receive from the honeybee is not from the honey it produces, but from the service it renders in pollinating the flowers of fruit and forage crops. This service amounts to many times the honey crop because without pollination there would be no fruits or seeds. It is estimated that the production of fruit in an orchard may be increased as much as 40 per cent or more by providing enough bees for adequate

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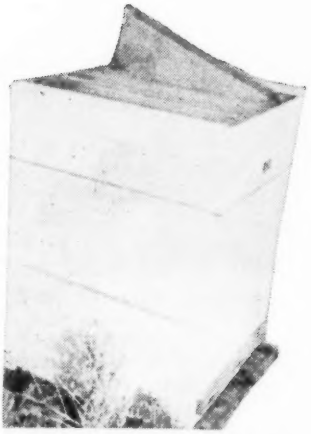
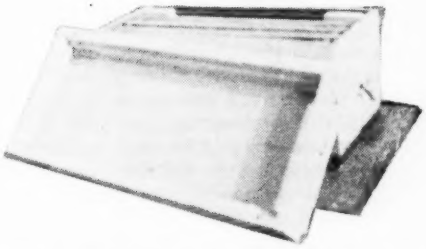


Feeding doesn't take the place of the proper amount of honey left on the hive.

John Holzberlein, Veteran Commercial Beekeeper, Reports on

Bee Feeding

For
1. Honey Production and
2. Queen Rearing



One of our queen-rearing nucs with four frames and a division-board feeder.

THERE IS no system of feeding bees that is an improvement on leaving abundant honey stored by the colony in its own hive. But the necessity for extra feeding of our bees seems to come to all of us at some time.

There are some men who are regular feeders. They take away a higher percentage of the honey at harvest time and if the colony does not fill up from some late source plan to feed sugar sirup to make up the deficit. But for most of us bee feeding is an emergency proposition, either when colonies fail to fill up well in late summer or use an excessive amount in wintering. Some of this feeding is done in the fall, but most of it is done in the spring, during the early build-up period before the first early spring flow.

It is occasionally necessary to feed during the gap that may come between the early flow from dandelions, fruit bloom, or whatever you have and the beginning of the main flow that may come two to four weeks later. Feeding at this time is really of the emergency type. But in some areas it has to be practiced quite frequently, not being a case of keeping the bees from starving so much as just keeping them building up at a rate that will bring them up to maximum strength in time to take full advantage of the main flow.

It takes some of us a long time to realize how much sirup has to be poured into a colony to keep it gaining when nothing is coming in from the field. Too much of this emergency feeding is done too late and only in

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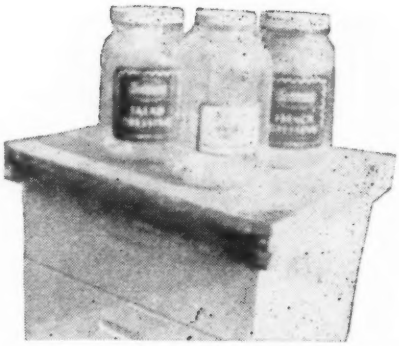
time to prevent actual starvation of the colony with the result that only a part strength colony is ready for the flow. What is even more tragic is for a colony to use all its stored honey and pollen, replace most of its old bees with young ones, double its strength, and then starve to death just before the flow begins.

In spite of all that has been said about leaving ample stores at the close of the season **the greatest cause of colony loss is starvation.** And countless pounds of honey are lost each year because bees fail to build up in time to reach full honey-gathering strength before a large part of the major flow is past.

We once believed that 40 to 50 pounds of honey left in the fall were enough, the books told us that, but we soon found out that in our area 40 to 50 pounds is often just enough to get the colony going good, just in time to starve to death a week before the dandelions bloom. With ample stores there is extra strength and now we usually get a surplus from dandelions. So we have raised our minimum to 75 pounds of winter stores, and even with this amount we find ourselves having to feed quite a few colonies during a spring when bad weather makes the dandelion flow come late or prevents the bees from working when it does come.

How Do We Do It?

Actually we use several methods, but the one that beats all others is to have enough supers of combs of sealed honey and pollen to set on any colony that shows up light in the spring. However, it seems hard to have enough of these and when they are exhausted we resort to the feeding of sugar syrup in an inverted container with a perforated lid. This is doubtless the most popular type of feeder in use. For years we used 10-pound pails and they are good, large enough for a fair sized feed, and handy to use. Their great fault is that once they are drained they sweat inside and unless they are pre-treated inside with tar, lacquer, or something more rust resistant than the microscopic coating of tin put on by the manufacturer they do not last long. This makes them expensive.



These jars originally contained salad dressing.

For that reason we have come to the use of the one-gallon jar now commonly used for supplying food stuffs like mayonnaise, pickles, olives, etc., to restaurants and institutions. We have found the restaurants in our town quite cooperative in saving them for us. It is better if they will also save the four-place carton that they come in. This makes them easy to handle and store. We have been paying 10c each for them which makes them less than half as expensive as 10-pound pails. They can be broken, and occasionally we lose one. But we lose the pail and the sirup when a pail develops a leak, and this often occurs while the pail is on the hive.

The jars are a little heavier than pails which adds some to the labor, but they also have a little more capacity than a 10-pound pail. They may be housed in an empty hive body when fed through the hole in the inner cover and the telecope cover used to cover the top. If more than one jar seems to be needed they may be placed right on top of the frames and two or even three fed at one time. Before storing them after use the lids should be loosened for if they are not loosened the sirup will dry in the threads and much soaking in hot water will be necessary before re-use the following spring.

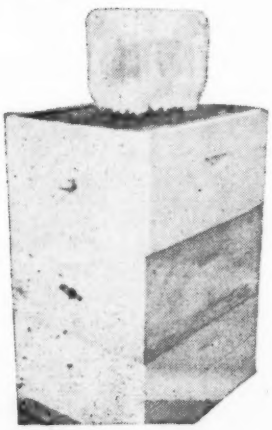
For the type of feeding we speak of above we find heavy sirup the best, viz, two parts of sugar to one part by weight of boiling water. A 100-pound bag of sugar added to a full six gallons of water will make about 15 gallons of sirup.

We do not hear so much about "stimulative" feeding as we did 20 or more years ago. However, I believe that there are locations where the spring flow is light, but where early sources of pollen are available it might pay. In so-called stimulative feeding a less concentrated sirup is used and feedings are made more often.

To me this does not seem important. It is my belief that a co'ony will make about as good gains if the honey and pollen are just accessible in the hive. Of course, the cluster must be large enough for the bees to use the feed efficiently and occasional flight days are necessary so that the colony may bring in water. About the only advantage that the thin syrup could have would be that the colony would need to gather less water to use it in larval feeding. The really important thing to remember is that a backlog of both honey or its substitute, sugar syrup, and pollen are needed in considerable quantity to build a full-sized honey-gathering colony. And that if we expect to make our living from the gains of the hive we should then step in when Nature fails to furnish the supply and see that our colonies are well provisioned.

There has been quite an epidemic of dry sugar feeding the past few years. Either a pan of dry sugar may be placed in an empty super on top of the frames or the sugar may be poured directly on the inner cover with the center hole open. Some tip the hive up in front and pour the sugar into the entrance. Bees will use quite a lot of this dry sugar at times, depending on the weather and the need of the colony. Strong colonies in warm weather may do fairly well on it. We have tried it rather extensively, and our decision was that while it is a good way to get rid of the sugar, it is not the best way to feed bees.

When more than one jar is needed they may be fed right on top of the frames.



Feeding Queen Rearing Nuclei

The feeding of nuc'ei in queen rearing or for making increase is a different proposition. Even though food may be available in the field the very lack of strength of the unit makes feeding necessary. Again combs of honey are the best feed. But in this case this statement should be limited to combs of **liquid** honey. The lack of strength makes it impossible for the nucleus to liquefy granulated honey and use it efficiently. For feeding queen rearing nucs there are some decided advantages to feeding a heavy, two-to-one sirup.

There is something in the moving and storing of the sirup that has a desirable effect on the morale of the nuc, making it far more likely for them to accept the artificial queen cell than if they have only stored honey in their combs. For this reason we like to give a feeder of heavy sirup at the time the cell is given, or better yet a half day before the cell is put in. For this purpose we use a division-board feeder that takes up about as much in width as a standard frame. They are one inch wide inside, six inches deep, and the length dimensions conform to those of a frame. We make our feeders in our own shop, cutting the framework out of standard one-inch lumber which gives a good solid support for nailing. The lower corners are rabbitted as extra proof against leakage. The sides are made of one-eighth inch masonite, or some other fairly hard pressed wood product and nailed right through so that both sides are held on with one nail which is then clinched. A five-penny, cement coated box nail does this just about right.

A small amount of hot asphalt roofing tar is poured into the feeder after it is all nailed up, run around inside to cover all the seams until it cools and then it is ready for use. One of these

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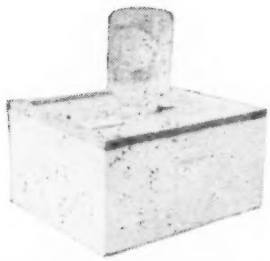
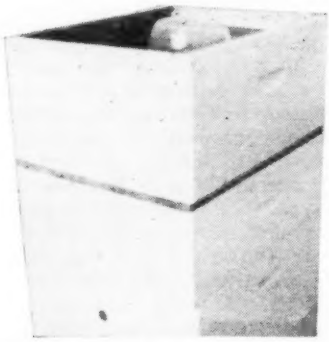
feeders will hold enough sirup to carry an average-sized nuc, containing a small amount of brood and about one-half-pound of bees, from the time one queen cell is put in until the queen is laying, or about 12 to 14 days. At this time the queen should be caught out. Care should be taken so that queens will be caught out soon after they begin to lay, for if they are allowed to lay for several days the large amount of brood will require so much feed that they will starve unless an extra feeding is given.

Whether one is producing honey or queens, a backlog of honey in the hive is always a paying proposition. It is like money in the bank—perhaps not needed at the moment, but good insurance against loss at a time when things go contrary to their anticipated course. There may be some places where the seasons and the honey flows are more accurately predictable than I have ever seen them. However, in the places where my experience has been gained, situations have continually arisen making feeding necessary at some time or another.

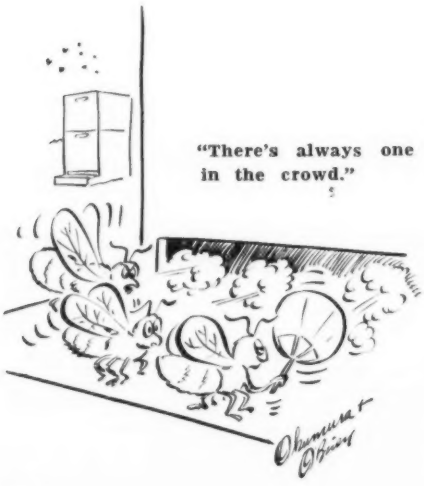
Even when we have felt certain that enough stores have been left on each hive in the fall, conditions can come up to make feeding necessary in some locations. A mild, open winter; a late backward spring; or a rainy spell during the blooming period of spring, all make for heavy consumption of stores without opportunity for their replacement. Then it is just plain good business to have suitable feeders ready if extra honey is not available, and be prepared to forestall loss by feeding before approaching starvation becomes more than a threat.



Jar of sirup inverted over hole ready for the empty hive body and cover.



Jar of sirup placed over hole in inner cover, ready for outer cover.



"There's always one in the crowd."

TREATING BEE DISEASES

(Continued from page 211)

measured in order to insure accurate dosages. It is suggested that small quantities be weighed by a druggist. Larger quantities can be weighed with fair accuracy in ounces (one ounce equals 28.4 grams).

Sodium sulfathiazole and streptomycin sulfate are readily soluble in a small volume of cold water. Fumagillin is less soluble and should be dissolved in a minimum amount of warm water —not over 150°F. These water solutions should be stirred thoroughly into the proper volume of prepared sirup. For mixed infections of American and European foulbrood, sulfathiazole and streptomycin sulfate can be included in the same sirup.

The Start of Beekeeping Extension Work

As told by
GEORGE REA, Reynoldsville, Pa.

Conclusion

ON ONE of the trips with Franklin Sherman by automobile we covered some new territory in northcentral counties of North Carolina. Many of the roads were rough. We met interested beekeepers and thought the trip worth while. The winding road to Blowing Rock provided wonderful mountain and valley scenery and was quite thrilling on the sharp curves almost too narrow to pass another vehicle in places where we seemed to be suspended in space over the valley hundreds of feet below. It is doubtful if there is a more awesome and inspiring sight on earth than that which we enjoyed from Blowing Rock that evening just before sunset. It cannot be adequately described. It has to be seen to be appreciated. That evening for supper and overnight and the next night also in the lodge of Mrs. Weedon at Blowing Rock was a real treat. She, a most gracious hostess, introduced each one of several travelers who were her guests. A pleasant and restful evening was enjoyed before the great fireplace in the living room.

A trip with Entomologist R. W. Leiby to Roper and other places down on the coast was quite in contrast to the western trips in the hills and mountains. In some places the roads were of sand so deep that the car could hardly pull through it, and in other areas the soil was mostly a peat-like muck. Some of the roads were not even well-drained, but heavy planks or corduroy of small logs made travel possible.

Several such trips were made to various parts of the Coastal Plain. Apiaries were larger in number of colonies than was usual for the middle and western areas of the state. Several beekeepers operated large numbers of colonies in modern hives. The mild climate afforded a long beekeeping season, and in many areas abundant in nectar-bearing flora the honey crops were profitable. At that time great drainage ditches were being dug and the land cleared for farming. The continuation of drainage and greater areas in cultivation, together with destructive forest fires, have since then greatly reduced profitable beekeeping along the coast.

The chief honey sources in the state of North Carolina were mostly woody plants, shrubs, and trees, that existed in all areas of the state. Among the most important to beekeeping were tulip, sourwood, black locust, tupelo or gum of several varieties, basswood or linden, holly, magnolia, huckleberry or blueberry, and gallberry.

In late January 1917 the grim reaper plunged our family into deep sorrow and interrupted the beekeeping extension work in North Carolina for a short time. It was advisable to return North, and because of the sudden turn of events E. F. Phillips did not have an immediate assigment for me. Because a successor had not been appointed to the position of State Apiarist in Pennsylvania after I left it in September 1916, I returned to that posi-

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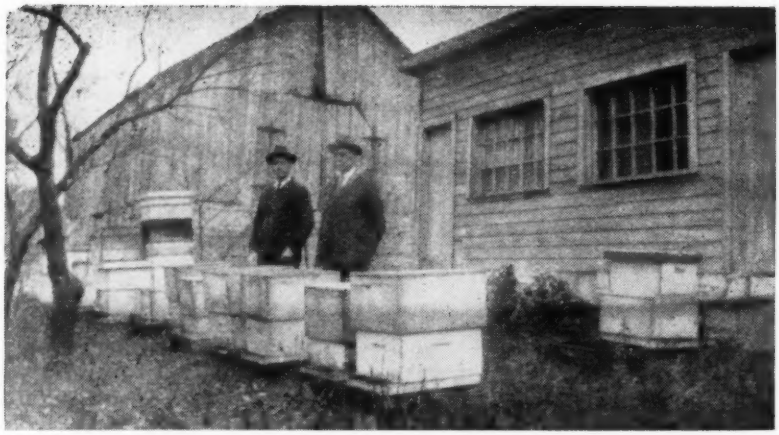


Left to right: F. R. Jordan, and Charles L. Sams in the Jordan home apiary, Wilmington, North Carolina, 1925.

tion for several months in the office of State Entomologist James G. Sanders in the State Capitol Building in Harrisburg.

Several weeks before leaving Raleigh, however, the problem of continuing the work so well under way resulted in the appointment of Charles L. Sams to that position. It was not easy to convince the men at Washington that Sams was the man for the place. He was untried, he did not have a college educaton; could he talk convincingly to an audience and could he really take the inconvenience and hardships of a field job even if he did know how to teach improved beekeeping methods? At my insistence he was given a chance to work with me and would be approved if he made good.

I wanted to talk it over with Charlie Sams personally, and the only way was to take again that trip to Marshall and by horse and buggy to his home at Mars Hill. That evening to a late hour we discussed the possibilities of the position and his ability to fill it. I told him I was authorized to offer the position to him on a trial basis. He would work with me for two months for $100 a month and expenses paid. If I could recommend him at the end of that period he would be appointed at, of course, a higher salary. The reaction of both Charlie and Mrs. Sams was characteristic of their appreciation of the higher values of life. They agreed that it would be a fine opportunity for the education of their children at Raleigh.

As expected, Sams made good and was installed permanently in the position of Beekeeping Extension Specialist for the U. S. Bureau of Entomology and the state of North Carolina about April 1, 1917. He liked hard work and achieving progress in beekeeping. He literally took off his coat and went to work with a vigor that probably has had no equal in the field of beekeeping public service. He personally transferred hundreds of colonies of bees from log gums and box hives into new modern removable comb hives, in seasonal demonstration meetings of beekeepers. In one demonstration meeting in an apiary of W. J. Martin of Wilmington, North Carolina, 100 colonies were transferred from box hives into modern hives in one day. He also stimulated the beekeepers to transfer thousands of colonies for themselves, all over the state of North Carolina. He was a friend to all and was constantly making friends who consistently practiced his teachings.

His remarkable career caught the attention of the editors of bee journals who featured him and his work in their publications. Beekeeping lost one of its most able champions when Charlie Sams' strength failed and he had to resign on June 30, 1941, and died on March 6, 1942. But he left a valuable legacy of beekeeping progress, from keeping bees in primitive hives into the most modern hives and latest improved practices that probably has had no equal over a similar period of service.

Beekeeping in *Alabama*

Reported by
W. A. RUFFIN
A. P. I. Extension Entomologist

A LOT OF people keep bees in Alabama.

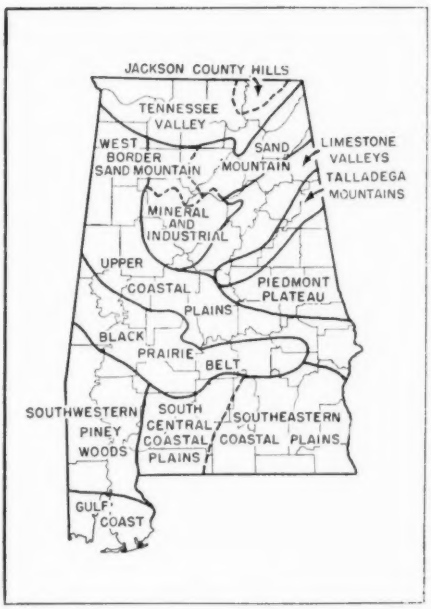
From one to not more than six colonies as a rule, may be found in the back-yards of homes in the largest cities or in the orchard on the most isolated farm home. These are bees kept as a hobby and for the production of honey for home use. It is likely that not more than 200 individuals derive most of their income from the sale of honey and could be classified as commercial beekeepers.

The climate and geological formations in the different parts of the state determine to a large degree the beekeeping potential of the area. In the Tennessee Valley and Sand Mountain areas, zero temperatures are not uncommon during the winter months. At the other end of the state there is a frost-free area along the Gulf Coast. This should give one an idea of the effect of temperature on the flora in the state. Soil types and elevation also affect plants. The extremes in elevation are sea level along the gulf and about 3,000 feet in the northeastern part of the state.

Primary Areas

It should be remembered that Alabama is not a major honey producing state. However, a few well-managed colonies will produce 100 pounds surplus honey per colony in selected spots. Such spots can be found in all parts of the state.

In the Gulf Coast and southwestern piney woods area, there are many streams and large wooded areas. Gallberry, tupelo gum, ti-ti, and pursley are the main sources of nectar. Many other wild flowers along with the ones listed above furnish some nectar almost every month of the year.

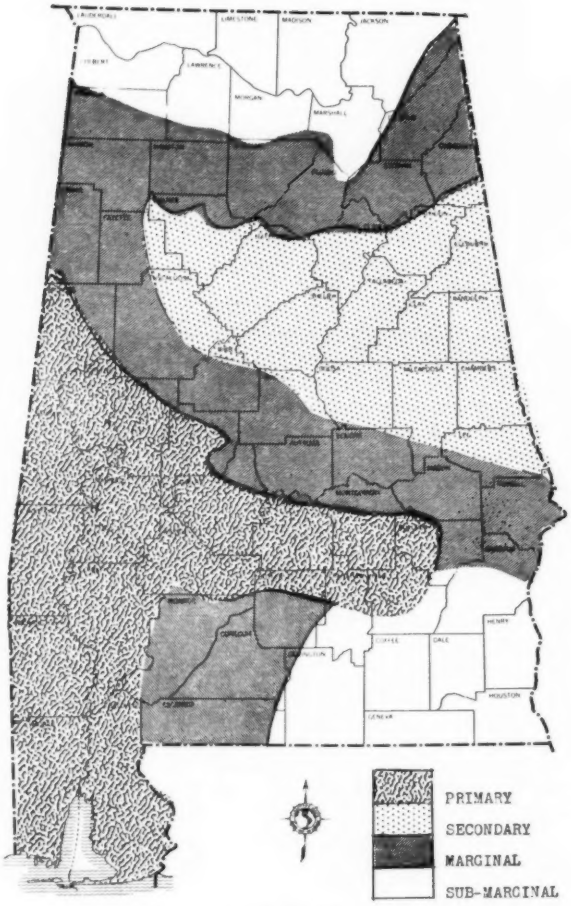


The black prairie belt at one time had large areas covered with melilotus. This area now has been converted to pastures for beef and dairy cattle. The melilotus is gone except along roadways. In the pastures, however, will be found white clovers. Crimson clover or Caley peas, asters, goldenrod, and partridge peas, are wild plants that grow in the area and help to make the black belt one of the best places in the state to keep bees.

Secondary Areas

In the area covered by the limestone valleys, Talladega Mountains, Piedmont Plateau, and the mineral belt, a wide variety of nectar yielding blossoms will be found. Large areas in these regions are taken up by streams

and wooded areas. In between the woods are farms both large and small. On most farms crimson and white clovers and vetch are grown for grazing and forage. In the woods poplar and sourwood trees are more common than in other parts of the state. Some parts of these regions are as good honey producing areas as there are in the state. In general, however, these areas are not as good as those discussed previously for the production of honey.



Marginal Areas

Those areas covered by South Central Coastal Plains, Upper Coastal Plains, and Sand Mountains are definitely marginal from the standpoint of honey production. Over some parts of these areas some of all of the major nectar producing plants that grow in this state will be found. Usually they are not found in large enough numbers or wide areas sufficient to interest the commercial beekeeper.

Poor Areas

The southeastern coastal plain is the poorest honey producing area in Alabama. Some gallberry, ti-ti, and tupelo gums are found in wooded areas. Crimson and white clovers are grown in pastures and pursley is common in fields. But there are very few bees found in the area. And this is proof enough that it is a poor area to locate for the production of honey.

The Tennessee Valley and Jackson County hills are areas taken up largely by row-crop farming. In some parts of these areas large plantings of clovers will be found. Also in the northeastern part of the state including the Jackson County hills are large wooded areas. In the woods poplar and sourwood trees are common. Spots in these regions can be found that are good for honey production. But generally speaking, the area is not good for bees.

Instinct or Intelligence?

AYLMER J. JONES, Malden, Massachusetts

THAT VERY interesting article "A Hazardous Experience with Connie and Dianne" by Glen Kimble in January 1956 GLEANINGS must have found many sympathetic readers who could recall similar loss of hives due to hurricanes and floods. This writer is one whose heart goes out to Kimble as a fellow sufferer. My experience in this connection had, in addition, a most (to me) unusual occurrence connected with it, that may interest readers of Gleanings.

Early in 1954 I learned of a nearby wild bee tree supposed to shelter a strong colony. Visiting the locale, I found the colony was in fact strong and well ensconced in the hollow of a very large tree growing in a swamp through which flowed a small brook. The hollow was 15 feet off the ground. With much trouble due to the terrain, I brought in a ladder, a wire screen cone, some 2 x 4's and an empty hive all fitted with frames of foundation. I proceeded to nail the cone over the wild colony entrance, erect a platform to hold the hive, place the hive in position with the hive entrance a few inches from the apex hole of the cone, and then silently steal away. This was about May 15.

Two weeks later I visited the location but found to my disgust that while I had read the book, the **bees** had not. There was not a single bee in the hive. It was too late in the evening to determine the trouble. All I could see was a few thousand bees clustered on the cone.

The next day, May 30, Memorial Day, I received an urgent call from the authorities of a large cemetery here in Malden to relieve them of three swarms of bees. Any other day and they would not care, but **Memorial Day** of all days in a cemetery. I went down to the cemetery without checking my equipment and upon arrival found I had only one sack with me. So all three swarms went into the one sack, and not having any place else to put them for the time being, I swung around to the bee tree. The three swarms now had become one big swarm which was dumped into the still empty hive perched up in the tree. Well, the better the day the better the deed, as they say. And whether it was because those bees came from hallowed ground or not I do not know, but they were certainly dedicated—dedicated to the proposition that no time should be lost in drawing comb. The tree colony remained aloof.

It was now well into June and I determined to ascertain the reason for the failure of my wild colony removal scheme. On a day when the bees were working with utmost frenzy, I perched on the ladder for some time with my nose practically in the cone. Only an occasional bee left the cone, but bees by the hundreds were coming and going from the **outside** of the cone. **They were passing nectar through the screen to the bees inside!** Evidently, just so many bees permitted themselves to be trapped outside and these fed the ones who stayed inside so life could go on as usual. (Could it be that foragers were outside and nurses inside?) I nearly fell off the ladder.

At this point I quickly tore off the screen cone and substituted a bee escape set in a board which was nailed over the hole in the tree. There was no fooling around with this. During the summer the wild colony population became depleted. I can only assume the wild bees were assimilated by the other hive which was by now (late August) a two-story affair and loaded with brood and honey. I began to think about removing the escape from the tree and letting my "domesticated" colony rob out the depleted colony. Then I decided to let the honey in the tree stay there and I set Labor Day as the magic date to take the hived colony home. About three days before Labor Day, Hurricane Carol hit, followed by Edna. I visited my hive and bee tree as soon as travel was possible. Woe was me! No hive, no tree, no land even—all washed down-stream. And that was one of the strongest hives I had ever had. What a revolting development!

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Editorials

Is There a Future for Plastic Hives?

WITH THE WHOLE world turning to plastics there is little doubt but that the beekeeping industry will some day follow this pattern. However, before such a move can be made it will be necessary to find a low priced yet strong and durable plastic. To date all of the plastics tried by our publishers, The A. I. Root Company, have proven to be too weak to do the job properly. When these plastics were strengthened the cost of the materials became excessive.

The plastic beehive advocated by Dr. Ing. O. Raudszus on pages 201 to 203 is a move in the right direction. While this hive, produced with American plastics, is still too expensive, it will cause beekeepers to start thinking about the subject.

We feel privileged to bring this article on plastic beehives to our readers. It's just like stealing a glance into the future. Whenever other material of this nature appears we will try to reprint it or summarize in our scientific column, "Bee Facts".

Adrenalin Injectors for Bee Stings

BEE STINGS, while unpleasant, are usually not serious. Most beekeepers become immune to stings after handling bees for a time. However, there are a few people for whom a bee sting is a rather serious matter and for those few it is usually necessary to give an injection of adrenalin with a hypodermic needle. In a few instances it has been necessary for beekeepers to g i v e up beekeeping in order to reduce the possibility of being stung by a honeybee.

Two articles regarding Ampin Hypodermic Injectors have appeared recently in bee journals, one in Bee Craft, the official organ of the British Beekeepers' Association for December, 1955, page 140, and the other in the Scottish Beekeeper, December, 1955, page 207.

It would appear that it may be possible for beekeepers in Great Britain who are allergic to bee stings to obtain the Ampin Hypodermic Injector which contains the correct dosage of adrenalin. We assume that directions for applying the adrenalin would accompany the package and that a beekeeper with ordinary intelligence could do it. We quote the following from Scottish Beekeeper: "Messrs. Caxton Gerrard and Co. have just put on the market the Ampin Hypodermic Injector containing the correct dosage of adrenalin. Ampins are ready for instant use and can be used by anyone. We recommend beekeepers to have ampins available in the apiary, particularly if it is known that anyone allergic to bee stings is exposed to the danger of being stung."

If ampins prove satisfactory it seems probable that they will eventually be available to beekeepers everywhere.

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Honey for Breakfast Week

EACH SPRING during the month of April The American Honey Institute provides an opportunity for beekeepers and handlers of honey to focus special attention on honey. This is needed in order that more people may become acquainted with the virtues of honey—nature's oldest and choicest sweet.

This year Honey Week comes somewhat earlier than usual—**the first week in April.** It is hoped that beekeepers may take advantage of the very attractive printed matter, honey recipes, and counter cards available at the Institute's office, Commercial State Bank Building, Madison 3, Wisconsin, at a very nominal cost.

Here is an opportunity for concerted effort among beekeepers and honey handlers to increase consumer interest and raise the per capita consumption of honey throughout the country.

Don't Let the "Iowa Apiarist Report" Cease Publication

WE WERE SHOCKED to learn that the veteran "Iowa Apiarist Report" will not be published any more. It's the old story of a shortage of funds, probably brought about through general apathy on the part of the beekeepers.

Through the years many of our readers have received this fine annual beekeeping publication free upon request. It was truly the American counterpart of the BEE WORLD, and probably the nearest thing to a scientific bee journal in the entire western hemisphere. A journal of this importance should not be allowed to die. Although local in name it was worldwide in scope.

We call upon the American Beekeeping Federation, the Southern Beekeeping Federation, the Eastern Apicultural Society, state and county beekeeping associations, the Beekeeping Division of the U. S. Department of Agriculture and all other interested beekeepers in the United States and Canada to assist in reviving the "Iowa Apiarist Report". Write to F. B. Paddock, Editor of the Report, Dept. of Entomology, Iowa State College, Ames, Iowa. He needs your letter in order to strengthen his case with the state legislature. Please do not delay for the need is urgent.

Multiple Queen Colonies

WE HEAR and read about the two-queen system of beekeeping. From experiments conducted during recent years it appears that considerably more surplus honey can be produced with a two-queen colony than with a single-queen colony.

The consensus seems to be that there is a limit to the number of two-queen colonies that can be operated, as compared with the operation of single-queen colonies. Managing two-queen colonies calls for expert and definitely timed manipulations not required in single-queen colony management. The two-queen system lends itself to back-lot rather than commercial beekeeping.

There may be and doubtless are, more two-queen colonies in the average apiary than the owners suspect. It is not uncommon to find two queens in a colony, mother and daughter, sometimes on the same comb, laying eggs. This may account for enormous colonies with brood in from 12 to 16 or more combs found occasionally.

The late George S. Demuth, former editor of Gleanings, once had a colony of bees with three laying queens, grandmother, daughter, and grand-daughter. Just why some superseded queens do not die or are not disposed of for a time, may not be well understood. At any rate, so long as they can lay eggs and are tolerated, they add to the colony population.

It would be interesting to know what percentage of the colonies in any given area have multiple queens. The only way we know how to find out would be to remove all the combs from each brood chamber and shake the bees at the front of the hive and let them enter the hive through an entrance guard or queen and drone trap.

Bee Facts

(A Digest of Scientific Research)

Edited by Walter Barth

What Does the Consumer Want in Honey?

A HONEY SURVEY conducted by the Colorado Honey Administrative Committee revealed some of the honey interests of consumers. An eight-ounce jar of Colorado honey was given to each adult completing the questionnaire. Here are some of the findings:

% of People	Type of Honey
98	used honey
56	preferred liquid honey
57	used honey as a spread
29	used honey in cooking
39	liked the one-pound jar
21	liked the eight-ounce jar
2	liked the 12-ounce jar
6	were familiar with honey mixes
65	preferred peanut-butter mix

The average price paid for honey was about 40 cents.

This data showed the committee that advertising should be concentrated to promote the sale of honey mixtures and creamed honey. More promotional work will have to be done at the retail outlets as many consumers didn't buy honey because they didn't think of it.
Colorado Bee Notes. December 1955.

Do Fertilizers Affect Nectar Secretion?

ELIZABETH CARLISLE and Margaret Ryle of the Bee Department of the Rothamsted Experimental Station, England, tried to find the answers through studying micro-plots of red clover. These plots were designed to test the effects of nitrogen, phosphate, potash fertilizers, and lime, on the secretion of nectar by plants sown (a) in the previous year and (b) in the same year as that in which the fertilizers were applied. Measurements of both nectar yield and plant growth were made.

Neither the growth nor the production of nectar was significantly altered by phosphate or potash on the second-year plots, nor had phosphate much influence on the growth of the first-year plots. (The initial phosphate content of the soil was adequate.) Potash significantly increased total growth and significantly decreased nectar production on the first-year plots. These results are discussed in relation to previous work. It is suggested that the contrast between the responses of the sets of plots may be related to the maturity of the plants. Nitrogen had little influence on growth and none on nectar in either set of plots.

Lime increased the nectar production of first-year plots, although it did not affect the growth of the plants, and this in spite of the fact that the initial pH of the soil was fairly high.

Carlisle, Elizabeth & Margaret Ryle. The Influence of Nitrogen, Phosphate, Potash, and Lime on the Secretion of Nectar by Red Clover in the Field. Empire J. of Exper. Agric. Vol. 23, No. 90. 1955. Pg. 126-130.

Can Bumblebees Easily Change Nests?

BUMBLEBEES EXHIBIT a well marked ability to adapt themselves to environmental changes that are much more severe than any which they are likely to meet in nature. So reports J. B. Free of the Bee Department of the Rothamsted Experimental Station, England.

This ability to easily change locations is accomplished by the adaptation of orientation mechanisms which they normally use. These mechanisms are (1) the orientation mechanism of a bee on its first flight; (2) the searching behavior of a returning forager, and (3) the re-orientation tendency of an outgoing forager which must be necessary when disturbance has occurred to the vegetation in the immediate vicinity of the entrance to the nest.

Free, J. B. The Adaptability of Bumblebees to a Change in the Location of Their Nest. Brit. J. Anim. Behavior. Vol 3:2. April 1955. Pg. 61-65.

Live and Learn

by Propolis Pete

GOSH, it's good to have April roll around again. Maybe good management means that a beekeeper starts his new year last summer, but when April comes along he gets his last chance to correct his mistakes or errors of judgement. Also in April we get the itch to propolize our fingers, over and above the fact that it is time to stir up off of our rear ends.

In some sections of the country, where most of the honey comes from, April is really the most important month of the year. Overwintered colonies may run out of stores even though they are flying to the fields some days. You may find some colonies in which the queen conked out during the winter, or developed dronitis. Other colonies may have superseded so late last fall that the queen did not get the chance to rear a force of young bees for spring work. These colonies need pampering, and maybe a little in the way of reinforcements. By feeding some, building up others, requeening or uniting still others, you can build up the entire force so that when the honey flow comes, you are ready for it.

As this is written in early March, I still don't know how my bees will finish out the winter. Excepting for two that I abandoned last fall because they were not worth saving, I haven't had any losses yet. I won't know for sure until I get a chance to look. With the usual lack of cooperation on the part of the weather man, we have had nice warm days only when I have other things scheduled that cannot be delayed. So, I don't know what things are like inside the hives. When the bees get the chance, they are all flying strongly, and are not doing much spotting. In other words, from outside, they look good.

It's been a tough winter, but the bright side is that I have had plenty of time to pretty up my equipment. When you do as much fooling around as I do, you generally end up with such a goshawful assortment of equipment that it takes a Philadelphia lawyer to keep it from getting all mixed up. I have regular bodies, regular shallows, deep shallows, and the very shallow bodies used for comb honey production in 4¼ inch sections. To complicate matters still more, I have some regular shallows fitted up for comb honey sections in the 4 x 5 size. When hives are built up with such an assortment, you have to guess pretty much what is going on unless you actually look into the hive. So, when refinishing the regular deep and shallow supers, they got a coat of the customary white. A little ultramarine pigment was mixed into the white and the deep shallows came out a pleasant sky blue. Some old yellow paint was mixed into the blue that was left over, and now the comb honey supers of both sizes are a most revolting sea-sick green. I hope the bees don't mind.

I have told you that I am experimenting with the deep shallows in the hope that I can use the advantages of a deep super without the disadvantages of heaving all that weight around when it comes to handling them. Last year the bees didn't work with me, but this year I know they will. Three of them will be the equivalent of a regular two-story hive, with the extra advantage that the bees can work sideways in two instead of only one level. Our friend and Editor points out that this will mean 30 instead of 20 frames to handle when looking over a colony, but we will see what comes of that. There is another thought in the back of my nut that I haven't told you about though. Maybe I shouldn't until I know what I am talking about, but anyway maybe it won't do any harm to let you in on the secret.

Professionals who produce comb honey for the market generally use two deep bodies for the brood nest until the time comes to put on the section

(Continued on page 250)

XUM

News Reel

2nd prize winner

1st prize winner

Federation Honey Display Contest

Twenty-four entries were received in the Federation's Honey Display Contest — not as many as expected but enough to make some very keen competition. Our congratulations to the winners and thanks to all of the participants for their efforts.

Display Winners:

1st prize - $50.00 to H. Elmer Mishler, 79 W. Manor St., Altadena, Calif. $50.00 duplicate prize to store manager Dan Flint, 2619 Catherine Rd., Altadena, Calif.

2nd prize - $30.00 to Earl W. Chaney, 1625 E. Division St., Decatur, Ill. $30.00 duplicate prize to manager Robert Bateman Food Store, 136 S. Main St., Hillsboro, Ill.

3rd prize - $20.00 to Henry Nepper, Minneiska, Minn. $20.00 duplicate prize to mana-

An outstanding honey display at the 1956 Pennsylvania Farm Show at Harrisburg. —A Beese & Stephen photo.

ger, National Tea Store, Winona, Minn.

The five runner-up winners and store managers each receiving $5.00 are as follows:

(1) Clarence Kraby, RFD 3, Austin, Minn. and Manager, Red Owl Supermarket, 108 East Water St., Austin, Minn.

(2) Honey Sales Co., 2817 North 2nd St., Minneapolis, Minn., and Mgr., Red Owl Super-Market, Crystal, Minn.

(3) Callie Burt, Box 284, Newberg, Oregon, and Erickson's Super Market, S. Commercial St., Salem, Oregon.

(4) Paul Ashers' Apiaries, Hastings, Minn., and Manager, Werths Food Center, 405 Vermillion Street, Hastings, Minn.

(5) Clarence Kraby, RFD 3, Austin, Minn., and Manager, Piggly Wiggly Super Market, 203 Courtland Street, Austin, Minn.

3rd prize winner

XUM

FROM Foreign LANDS

Translated and Edited by Erika Barth

Books and Beekeeping

ONCE AGAIN we have come upon an interesting account of beekeeping history by Dr. H. Malcolm Fraser of England. In this manuscript he draws comparisons between the appearance of new literature (following the invention of the printing press) and the development of beekeeping.

One of the most interesting books mentioned is "Van de Bien", a famous old Dutch book by Dirk Cluyt that was published in Leyden in 1597. The author was a botanist who practiced pharmacy at Leyden where he was in charge of the botanical garden which had been founded there in 1577. This writer's opinion concerning the sex of the ruler of the honeybee colony (queen) was different from others of his period. Other bee masters of the time were of the opinion that the main being in a colony was a king, but Cluyt believed it to be a hermaphrodite (an individual having both male and female organs). It wasn't until 1609 that Butler (England) informed the world that the "Kingbee" was really a queen because he saw her lay eggs.

Beekeeping. Vol. 22. No. 1. Jan.-Feb. 1956 (England).

Inhibiting Ovary Development in Worker Bees

PREVIOUS STUDIES showed that ovaries of worker bees did not develop so long as the workers had direct contact with a queen, living or dead. S. Voogd of the Laboratory of Comparative Physiology at the University of Utrecht found a way to prevent this effect.

The scientist found that an extraction of the body of a queen with acetone or ethanol prevents this effect and bees are no longer attracted to the body. Reapplication of the extract to the body restores both the ovarian effect and attractiveness to workers.

In the present article the author shows that similar extracts of worker bee bodies have no such effectiveness whereas application of queen extracts to **workers, drones,** or PIECES OF WOOD, made these attractive to workers.

The writer cannot judge whether workers ingesting this substance can pass it to others, making it unnecessary for all workers to contact the queen.

Experientia 11:181 (May 15) 1955.

The African Honeybee

THE BEE used for beeswax production in Tanganyika, Africa, is the common African honeybee, **Apis mellifera unicolor** variety **adansoni** Latr., named after the Baobab tree, **Adansonia digitata,** whose hollow stems are so often used as nesting places.

The **adansoni** bee is a yellow-banded variety not unlike the Italian bee used by commercial beekeepers in Europe and America, but a little smaller. It is a highly successful insect, maintaining a large population of colonies throughout Africa south of the Sahara. It survives despite widespread droughts and dearths of nectar. If its food supply is exhausted it will not wait and die of starvation in the hive like European bees but will migrate to a more favorable area. Further, these African bees are free of the bee diseases that weaken and destroy so many colonies of bees in Europe, Australia, United States, and Canada.

Being constantly attacked by many enemies, especially ants, hive beetles, pirate wasps, birds, lizards, the longer badger or ratel (**mellivora capensis sagulata** Hollister), and man, the African honeybee is of necessity always ready to defend its hive. For this reason it has gained a reputation for being very fierce. Individual colonies vary considerably in their temper, but the bees do not attack unless something upsets them.

Tanganyika Bee. Div. Pamphlet No. 1.

Asked & Answered

Time Required for Introducing Queens

Q. When introducing a queen how long must she be in the cage before being released among the bees?

A. This depends on circumstances. If there is a good honey flow the new queen may safely be released within 24 to 48 hours; but if there is a dearth of nectar it may be necessary to keep her caged four or five days. When queens are introduced during a dearth of nectar when bees are inclined to rob, a piece of tin can be tacked over the candy hole so that the bees can not begin eating out the candy for two or three days, thus delaying the releasing of the queen.

Moving Bees Across State Line

Q. Do you have to have a health certificate on all bees moved across state lines?

A. In order to move bees from one state to another, it is necessary to get a certificate of apiary inspection from the state apiarist of the state from which the bees are moved; also a permit from the state apiary inspector of the state into which the bees are to be moved. In this way, there is a thorough understanding by all parties concerned. There are some states that do not permit the entrance of bees on combs.

Dead Bees in Front of Hive

Q. I found from 4000 to 5000 dead bees in front of one of my colonies while none of the others had more than 200 to 500 dead bees. What would cause this great difference?

A. The large number of dead bees may be a result of this colony's having a larger number of old bees last fall than the other colonies, and these are chiefly the old bees that lived into the winter instead of dying last fall. A large proportion of old bees in the fall could be brought about by an unusual amount of brood rearing sometime last summer. Again, some colonies are more energetic in searching for nectar late in the season when nectar may be scarce, in which case the old bees wear themselves out rapidly, where a colony not so energetic might retain its old bees until the beginning of winter.

Do Bees Have a Sense of Taste?

Q. Can honeybees distinguish between sweet, salty, sour, and bitter flavors?

A. Dr. Karl von Frisch, Professor of Zoology at the University of Munich, carried on a lot of experiments on this subject and recorded the results of his work in "Bees, Their Vision, Chemical, Senses, and Language," published by the Cornell University press. The work of this scientist reveals that honeybees can distinguish between sweet, sour, salty, and bitter flavors. Bees are a little more sensitive to salt than are human beings and the same holds true for sour materials. However, honeybees are less sensitive to bitter substances than are human beings. Bees are also sensitive to sugar solutions as low as only one or two per cent. It was found that bees preferred sucrose, then fructose, and finally maltose. Lactose was refused unless diluted with sucrose or some other less desirable sugar.

Bees Starve with Honey in the Hive

Q. After a severe cold wave in December when the thermometer went down to 30 degrees below zero, I found the strongest of my colonies was dead. There were nearly two gallons of dead bees in the hive. It was a two-story hive, but was not packed. They did not have a large amount of honey in the hive but there was some, possibly about ten pounds. Can you give the possible reason for this loss?

A. This colony probably starved to death because the bees were not able to move to the honey. Such a small amount of honey in the hive for winter is dangerous, for the cluster may lose contact with the honey during a cold spell. The cluster should be surrounded with honey, both above and at the sides. When there is a large amount of empty combs the bees form their cluster on the empty combs adjacent to the supply of honey. Usually the margin of the cluster envelopes some of the honey, and during each warm spell of winter the bees will carry some honey into the middle of the cluster for immediate use.

Keeping Mice Out

Q. How can I keep mice out of hives during the winter months?

A. One way to keep mice out of hives during the winter months is to place a one-quarter-inch wire mesh over the front of each hive. This will permit bees to pass through the wire and will exclude mice. The majority of beekeepers use an entrance closer which reduces the hive entrance down to 5/16th of an inch by about four inches. This opening will exclude mice and at the same time it keeps some of the cold air out of the hive.

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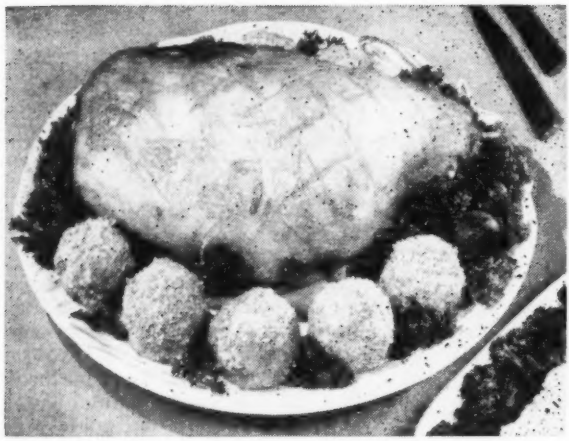


Good the Honey Way

MRS. BENJ. NIELSEN
Aurora, Nebraska

Honey-glazed ham and yams rolled in cornflake crumbs are a good team. — Photo Courtesy Kellogg Co.

NOW THAT pork is so plentiful and the price so reasonable it behooves the cook to find ways to serve this meat frequently and in new guises so the family will not tire of it. Ever try honey as an aid? No? Then you have some real taste treats in store for you! Many of you, no doubt, are familiar with a honey glaze for ham. This is about the most simple way to make a start a la honey. You may combine fruit juices and honey, basting frequently after the rind has been removed and the fat scored as usual. Or you may cover the ham with with honey and return to the oven to brown nicely. Perhaps you will enjoy a blend of one-fourth cup prepared mustard or two teaspoons dry mustard and honey to cover the ham. If you are partial to brown sugar with ham, blend equal parts of honey, brown sugar, and 2 teaspoons dry mustard.

And for good measure here's honey fruit salad that is easy to prepare and delightful with ham or pork.

Honey Fruit Salad

One large can (1 lb. 14 oz.) fruit cocktail, 1 tablespoon cornstarch, ⅓ cup honey, ⅓ cup fresh or canned lemon juice, 1 pint of cottage cheese, and salad greens.

Drain fruit cocktail, measure ⅓ cup of the sirup into a small saucepan. Stir in cornstarch till smooth. Add the honey and lemon juice. Cook over low heat, stirring constantly, until clear, about five minutes. Chill. This makes about one cup. Arrange cottage cheese on greens, top with fruit cocktail. Spoon dressing over fruit.

Pork Loin Roast

One 4-pound pork loin, 1 tablespoon salt, slivers of garlic, ¼ cup brown sugar, ¼ cup honey, 2 tablespoons vinegar, 1 teaspoon dry mustard, and ⅛ teaspoon cloves.

Place roast fat side up. Rub with salt and insert garlic. Do not use water and do not cover. Insert a roast meat thermometer through fat side into center of roast so the thermometer does not touch bone. Rub with mixture of brown sugar, honey, vinegar, mustard, and cloves. Roast in slow oven 325 degrees, until the roast meat thermometer registers 185 degrees. Spoon drippings in the pan over roast occasionally during roasting. Allow 15 minutes after removing from oven before carving. Serves 8 to 10. Delicious sliced and served cold.

Ham Vegetable Loaf

Three cups ground cooked ham, ¾ cup chopped celery, ½ cup minced onion, 1 cup grated raw potatoes, ½ cup frozen peas, thawed, 3 medium carrots, ground, 1 green pepper, diced, ½ cup dried bread crumbs, 1 teaspoon salt, freshly ground pepper, 2 eggs, slightly beaten, and 1 cup tomato sauce.

Combine ham, vegetables, bread crumbs, and seasonings. Blend together eggs and tomato sauce. Add to ham mixture and mix well. Turn into large greased loaf pan. Bake 45 minutes in a moderate oven, 350 degrees. Baste frequently with one teaspoon each of cinnamon and cloves, two tablespoons vinegar and 2 tablespoons honey which have been blended together. Serves 8.

Let's talk about honey plants

HARVEY B. LOVELL,
University of Louisville

Sweet pepperbush (clethra acuminata ericaceae).

Sweet pepperbush (Clethra alnifolia). This important honey plant grows from southern Maine south to Florida and west to Texas. It grows near the coast in damp places and occasionally in sandy thickets. A related species occurs in the eastern mountains, and a third in the southeastern area. The honey is usually white and mild-flavored with the odor of the bloom. The combs are also white. .

Massachusetts. Along the coastal area sweet pepperbush is a major honey plant. Great areas are almost completely covered with the shrubs which grow from four to 100 feet tall and produce great numbers of long clusters of fragrant white flowers in July and August.

Rhode Island. H. A. Pike, the state inspector, writes me that he obtains surpluses up to 75 pounds of excellent, light-colored honey with a spicy flavor and adds with enthusiasm, "Best honey in the U. S."

Connecticut. Clethra grows in the southeastern part of this state and here Allen Latham speaks highly of the honey which he describes as having almost no color, a fair body, and an excellent flavor. However, it fails in two out of three years in his area.

New Jersey. Milton Stricker writes that sweet pepperbush blooms from August 1st to the 20th in his state and produces an excellent honey when there is a good season, but he finds the shrub a fickle yielder.

North Carolina. W. A. Stephen reports that Clethra blooms from July 1st to the 22nd and produces a small amount of mild honey with a fair body and good flavor, but it is not a major source in his locality. I have a sample bottle of Clethra honey put up by J. Richard Carr of Plymouth, which has a delightful flavor and aroma.

Georgia. A. V. Dowling writes me from Valdosta that the shrub blooms from June 1 to July 15 in that southern area and produces a light-colored honey with a mild, spicy flavor. He obtains surpluses of 20 to 30 pounds especially in dry seasons. When I visited Mr. Dowling in early August, we found some bushes that were still in bloom and found that it was the southern pepperbush (**Clethra tomentosa**).

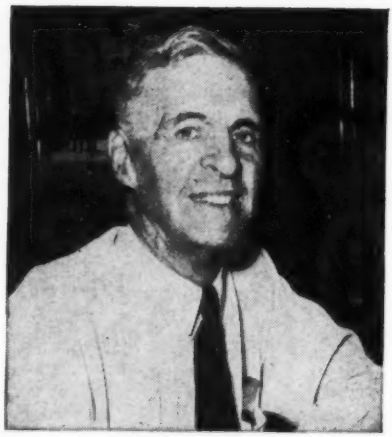
Manzanita (Arctostaphylos manzanita). Clarence Wenner of Glenn, California, writes me that he makes an average surplus of 30 to 50 pounds of white, heavy honey with a slightly bitter flavor from manzanita and that his largest surplus for a single hive is 200 pounds. The low shrub blooms from November all winter and well into the following summer. A dwarf variety may be still blooming as late as August 1 at 7000 to 9000 feet elevation.

Toyon or California holly (Heteromeles arbutifolia). Mr. Wenner reports

(Continued on page 252)

A Talk to Beekeepers

M. J. Deyell



Jack Deyell

"To know just what has been done, then to do it, comprises the whole philosophy of life."—Sir William Osler

THE ABOVE can be applied to beekeeping. However, it is a little difficult at times to know just what should be done in managing bees. Our best judgment should be the result of experience and knowledge acquired during the years.

Some beekeepers may take up with some fad, some so-called new idea, and sometimes they will try it out on an entire apiary, instead of a few hives, to see if it actually works. If we do try some experiments it seems advisable to try them on a few colonies, and in order to make a comparison we should have check colonies nearby. Things are what they are by way of comparison. Sometimes an idea we think will revolutionize our beekeeping does not pan out so well.

We Need to Use Common Horse Sense

The longer I keep bees, the more I realize that beekeeping is not a complicated business, but that successful beekeeping depends on following a few fundamentals or principles that govern success. If our apiary management is governed by these principles we are likely to be successful. If we disregard these principles, we are apt to fail.

At the risk of being repetitious let me say once more that bees need three things: **food, comb space, and protection.** Intelligent apiary management is based on supplying these three requirements at the proper time.

We Are Slow to Learn

It takes a long time for beekeepers to learn that in order to have their colonies up to peak in strength to take full advantage of the major honey flow, it is necessary to provide an abundance of stores and see to it that colonies do not run low on them during the critical months of spring when maximum brood rearing is so essential.

The bee masters have said that a colony of bees should never have less than 15 pounds of honey in the combs at any time during the spring months. This would be the equivalent of three full standard combs of honey. I wonder how many of us are guilty of having some colonies with less than that amount of honey during the spring months.

Perhaps you have noticed how a colony with an extra amount of honey early in the spring will build up to an enormous strength, provided, of course, the colony has a good queen and good combs in the brood chamber. Some extra honey on hives is never lost. As a matter of fact, it is a good investment in that it is turned into young bees which increase the hive population, which in turn results in more surplus honey.

It is hard for beekeepers to thoroughly understand this. It took me a long time to see the light, and I'll have to admit that I sometimes fail to live up to the requirements I have outlined for maximum success in honey production.

As I see it, the trouble goes back to the previous fall when we remove surplus honey. We want to get as much surplus as possible and we rob the bees too closely, consequently in some instances they may not have enough to eat during the winter and if they do manage to pull through the winter, they may run short on stores during the spring months and have to be fed.

We may as well admit that one reason we do not secure more surplus honey is that we are at fault in not

leaving the bees enough to eat. Honey crops throughout the country could be greatly increased if only beekeepers would stop short-rationing their bees during the winter and spring months.

A Word to Beginners about Manipulating Colonies

Obviously, there is a right way and a wrong way to examine colonies in the spring. We should wait until the weather is reasonably warm, at least 65 degrees F. before opening hives to examine combs with brood. Bees should be working well, carrying in honey and pollen. If the weather is cool and bees are not bringing in nectar and pollen, they are likely to resent being handled. This may cause some trouble among neighbors, especially in a residential section of a town or city.

You need a good bee smoker, a good bee veil, and a hive tool. Some wear bee gloves. I wear them, mainly to keep the propolis off my hands. If you wear a cotton veil, be sure to light the smoker before putting on your veil, or the flame from the smoker as you light it may burn the front of your cotton bee veil.

Examining Combs

Stand at one side of the hive and if possible with your back to the sun. In this position the sun will shine over your shoulder, down into the bottoms of the cells, enabling you to see eggs and young larvae. After the bees are driven down between the combs by smoke, some operators hold the bee smoker between their knees while handling the frames. Others hang the smoker on the end of the hive by means of a hook which is furnished with each smoker. When the bee smoker is held between the knees, the hot barrel of the smoker may burn holes in trousers so one must be careful about this.

Shove the hive tool down between the end bars of the nearest outside frame and the wall of the hive and pry the frames over to the opposite side. Then separate the first frame from the adjacent one and carefully lift it out. After this frame is examined it should be stood on end at the front corner of the hive in a position that will not obstruct the hive entrance. The queen is not likely to be on this comb but if she should be and takes a notion to leave the comb, she could easily crawl into the hive entrance. If the comb is placed at the back corner of the hive, the queen might crawl off into the grass and be lost.

After the first frame is removed and examined, the next frame should be removed, examined, then placed back in the hive against the nearest side. The remaining frames should be removed and combs examined, then placed back in the hive in like manner. Before putting the first frame removed back into the hive, the frames in the hive should be pushed over to the farther side, all at one time, to make room for the frame that was stood at the front corner of the hive. Pushing all the combs over at one time avoids killing bees and saves time.

If the colony occupies a double story or food chamber hive, the upper chamber should now be lifted off and placed crosswise on the rim of the outer hive cover which is turned upside down. This avoids killing bees adhering to the bottoms of the combs. The lower chamber of the hive should then be examined. At the first spring exami-

Digging out from a heavy snwfall. Snow gives good insulation against the cold.

nation, most of the brood will be found in the upper chamber, but when the weather gets warmer, the queen will occupy both chambers.

Conditions within the Hive

In some of the southern states hives are over-flowing with bees during this month. In the northern states and Canada, a normal colony should have at least three pounds of bees and if not clustered tightly should cover six or eight combs. On a cold morning the cluster should occupy at least four to six spaces between combs.

The combs on the sides of the hive near the hive walls should consist mainly of sealed honey. Some of the combs in the center of the hive, perhaps three or four, depending on the season and the latitude, should contain brood in all stages, sealed and unsealed, as well as honey and pollen. In the latitude of northern Ohio, a normal colony during early April should have brood in from three to six combs—that is, patches of brood, not full combs of brood.

Some of the cells adjacent to the brood will contain pollen of various colors. Balls of pollen will frequently be seen on the legs of the bees as they enter the hive. Pollen is packed into the cells to be used as larval food. Frequently, considerable nectar is gathered and may be seen glistening in the open cells.

The worker cells from which worker bees emerge are approximately one-fifth of an inch in diameter and about seven-sixteenths of an inch in depth. In the lower portion of the combs, large cells about one-fourth of an inch in diameter may be found. These are drone cells which are about nine-sixteenths of an inch in depth. Drone cells when capped over project somewhat beyond the general surface of the worker brood combs and look like the ends of bullets of cartridges intended for rifles. Queen cells are shaped like peanut shells. They face down and may be found later on in strong colonies getting ready to swarm.

Giving More Comb Space

This simply means putting on supers when needed. In the latitude of northern Ohio colonies that have wintered well sometimes become quite populous during the latter part of April. It then becomes necessary to give each colony a super containing extracting combs, preferably drawn combs. Most beekeepers place this super over the brood chamber without using a queen excluder. This gives the queen a chance to go up into the combs of the super to lay eggs, if she needs laying space. If extra comb space is not provided, such strong colonies may make preparations for swarming.

Later on when the main honey flow starts, it is necessary to put the queen down into either a single or double brood chamber, below a queen excluder. There is likely to be some brood in the combs above the excluder which tends to attract the bees into the supers.

Feeding Dry Sugar

Some colonies may need some food during April. We have found that ten-pound bags of granulated sugar are handy to carry to an outyard. If it is impossible to drive from the road into the apiary, these small bags of sugar can be easily carried into the yard. It is a simple matter to make an opening at one corner of the top of the bag and pour the sugar onto the inner cover which should have the center block removed so that the bees can get up through the hole to take the sugar. As mentioned previously, the space on an inner cover will hold about three pounds of granulated sugar. If bees are badly in need of food it seems preferable to feed sugar sirup.

"He's so lazy he'd rather walk around with a swarm than shave."

Even the Birds Love Honey

Reported by ALFRED E. LEIGHTON

APPEARING IN "Science" a study by Herbert Friedman, Curator of Birds at the U. S. National Museum, and reported in a bulletin issued by the Smithsonian Institution, records the strange habits of certain African birds known as "Honey Guides"—distantly related to the American woodpecker. To satisfiy their craving for honey, the birds act instinctively to guide humans, baboons, and ratels (honey badgers) to the nests of wild honey bees.

The study was made by personal observations of the author in 23 instances, and supported by the stories from reliable African associates. When a honey guide bird is ready for work so to speak, it approaches a person and begins calling or making a series of churring notes (not unlike the sound emitted by a half empty box of matches when shaken sideways quickly). As soon as a person approaches to within about 15 feet of the bird, it flies off with a noticeable downward swoop (as much as to imply follow me) and goes to another tree—one, not always in sight, but along the route. Arrived at the next station the creature waits, churring loudly all the time, until the person reaches the vicinity. The process is repeated until the bee's nest is finally reached. The honey guide then stops calling, and perches quietly nearby—obviously with great expectations.

When the bird follower has opened the hive and departed with his load of honeycomb, the bird descends from his perch, and begins to feast on the pieces of comb left lying around. The honey guide has been known to wait patiently for its share of the loot for periods varying from a few minutes to longer than one and one half hours. In addition to enjoying the honey, the feathered gourmet is able to digest the wax also—but that is the subject of another story.

Officers of the American Beekeeping Federation Auxiliary

Left to right: Mrs. Hood Littlefield, Pasadena, California, Vice President; Mrs. Newman I. Lyle, Sheldon, Iowa, President; Mrs. Herald Partello, Boone, Iowa, Secretary-Treasurer of American Beekeeping Federation Auxiliary.

Just News

The **Middlesex County Beekeepers' Association (Mass.)** will hold its final indoor meeting of the spring season on Saturday, April 28, 1956, at 6:30 P.M. The meeting will be held at the Massachusetts Experimental Field Station in Waltham. At this meeting the Association will hold election of officers for the 1956-1958 term.

Prior to the pot-luck supper members will install a package of bees in a new hive. This hive will become the "Club Hive" and will be taken to each outdoor meeting during the spring and summer months. At the end of the season in September the hive will be given to some lucky member. The Club Hive is inspected at each of the summer meetings, and is of great help to new beekeepers who have started new hives.—L. C. Proctor, Sec'y.

The annual meeting of the **Maine State Association of Beekeepers** will be held in conjunction with the "Farm and Home Week" program, at the University of Maine, Orono, Maine, on Tuesday, April 3, 1956, with Dr. Charles O. Dirks, presiding. — C. A. Stanhope, Sec'y.

The **Westchester County Beekeepers' Association** will hold its next regular meeting at the Odd Fellows Hall, 20 Lockwood Avenue, New Rochelle, N. Y., on April 15th at 2:30 P. M. A demonstration will be held on installing package bees and bee problems will be discussed. Refreshments will be served by the "Queen Bees." — Mrs. Alfred Roth, Pub.

The **Midwestern Beekeepers' Association** will meet April 8 at 812 Westport Road, Kansas City, Mo., at 2 p.m. Program under discussion will be: Queen Introduction; Making Divisions; and Foul Brood. Door prize and refreshments. All persons interested in beekeeping are welcome. — Mrs. Wm. Brite, Sec.

The **Worcester County Bee Association** will hold its next meeting at the Worcester Natural History Museum, 21 Cedar St., on April 21. A pot-luck supper will be served at 6:30 followed by a short business meeting. At 8 o'clock the class will begin with Wallace Parker speaker.—A. W. Rozenas, Pub. Chairman.

The annual spring meeting of the **Connecticut Beekeepers' Association** will be held April 21, 1956, starting at 10 A.M. at the Hartford Y.M.C.A., corner of Jewel and Pearl Sts., Hartford, Conn. Beekeepers are urged to attend this meeting as the annual election of officers will take place. There will be a speaker for the day and lunch will be in the Y.M.C.A. cafeteria. Out-of-state beekeepers are welcome to visit our meeting.—Philemon J. Hewitt, Jr., Chairman of Publicity.

The American Honey Council Elected Officers at Biloxi—R. B. Willson of New York was re-elected Chairman. John Holzberlein, Jr., of Colorado, was elected Vice Chairman. L. H. Little, of Tennessee, was re-elected as Sec.-Treas. The membership of the Council consists of representatives from each of the cooperating organizations: The American Beekeeping Federation — S. Joaquin Watkins, Ray Reed, Henry Hanson, and John Holzberlein, Jr.; American Bee Breeders' Association — L. H. Little; Bee Industries Association — R. H. Dadant and Alan Root; National Honey Packers and Dealers Association — Roland Stone and R. B. Willson.

The Council acts as a co-ordinating and advisory group. One of its chief objectives also is to raise new funds primarily for the promotion of honey. The funds from the new voluntary check-off plan are collected by the Council and then disbursed to the American Honey Institute and the American Beekeeping Federation. The plan is getting off to a good start with a large number of producers and packers agreeing to participate.

According to **Nebraska Bee Tidings** for February 1956, floods in Yuba City, California, area caused an estimated loss of 6000 colonies of bees.

The **Eastern Missouri Beekeepers' Association meeting** will be held on

April 3, at the Court House, Clayton, Missouri, at 7:30 P.M.

The dates for the **Short Course on Queen Rearing** at Pennsylvania State University are June 18, 19, and 20, and for the **General Management Course,** August 13 to 17 inclusive. If interested, write to D. R. McClay, 203 Dairy Bldg., University Park, Pa., for particulars.

The annual monthly meeting of the **Southern Tier Beekeepers' Association** will be held at 8 P.M., April 10th in the Farm Bureau Conference room, City Court House. Everyone welcome. Mr. A. C. Gould, State Inspector, will be with us. A light lunch will be served.—H. B. Webb, Sec.

Detroit Bee School. On April 21 the Wayne County Beekeepers' Association of Michigan will once again sponsor a free beekeeping school for beekeepers of the Greater Detroit area. Beginners and veterans are welcome. Details are available from A. Tennenhouse, Prairie View Honey Company, 12303 12th St., Detroit 6, Michigan.

The **Morris County Beekeepers' Association of New Jersey** will meet at 8:00 P.M. Saturday, April 7, in the Y.M.C.A. building in Morristown. Speakers will be Joseph Novotny, William Garthe, and veteran Paul Holcombe. To be discussed will be "What is the place of Fumidil-B in beekeeping?"

Wisconsin Beekeepers' Association District Meetings. April 5, 7:30 p.m. Southwestern district meeting at Sparta in the Court House. April 11, 10 a.m. Northcentral district meeting at Marshfield. Experiment Station Service Center (3 miles S. E. of Marshfield). Luncheon to be served by church organization.

Bee Lore

Illustrated by
V. R. Stephen

THE DEATH OF A BEEKEEPER — When a beekeeper dies in Bohemia, his hives are covered with a black cloth. Near Oldenbourg, Germany, the hives of the deceased are moved to another stand. Another ancient legend says that if the announcement of the death of the beekeeper is not made the bees will abscond and never return.

American Honey Institute News Notes

HARRIETT M. GRACE, Director

GENERAL FOODS has some new thoughts on packaging that are worth passing along to the honey folks. If we can qualify under all these counts, our honey will sell.

1. Quick identification of product. The homemaker doesn't want to search around through a maze of food labels to spot the one she is looking for. It must be easily recognized if it is to command a repeat sale.

2. Accurate information. Those two words speak firmly for themselves.

3. Package must open promptly and easily. Homemakers seem to prefer a screw jar to a pry-up type. Unpopular with the homemaker are the perforated openings on packages that break her fingernails, or the key type cans that are hard to wind. Also on the thumbs-down list are small necked bottles that make it hard for the honey to come out.

4. Easy-to-read directions and menu suggestions are good.

5. Homemakers **expect** and **want** recipes on labels.

6. All-around labels on glass jars are not good. How can she tell when she's almost through with the jar! Perhaps the answer is in a transparent label.

7. There seems to be a trend toward packaging in single unit packages. Here honey cannot fall behind. Individual honey servers on the order of the tiny Morton salt shakers would be a real find for the homemaker. On the other hand, large economy packaging is accepted by the homemaker on some items if it means a real saving to her.

8. Disposal packages are on the up.

All of these tips must be noted and remembered by the honey man who hopes to hit the retail food market this year.

* * * * * * * * * *

1956 again will bring favorable economic conditions for strong demand, sharp competition, and increased advertising and promotion. So think the nation's leaders of the top food industries. In other words, 1956 will be like 1955, only more so.

This business of selling food calls for spunk and drive and lots of spirit. If you can't provide it, you better find another way to earn a living. However, the experience at the American Honey Institute has shown that honey folks have an abundance of this competitive energy. They want to know only which way to direct it.

In the honey industry the field is unlimited. So much remains to be done.

We at the American Honey Institute already have our '56 plans well laid. We hope to execute them with preciseness and decision. And we hope that our work will supplement yours in a very real way.

* * * * * * * * * *

Honey for Breakfast Week Begins Easter Sunday Morning

The following pieces of point-of-sale material are ready for you to order:

LEAFLETS: Honey for Breakfast, Honey to Start the Day Right, Honey and Cereals, Two Sweet Gifts.

POSTERS: Enjoy Honey on Cereal, Honey on Grapefruit.

STREAMERS: . . . Gee, it's Honey for Breakfast, Honey, it's a Taste Thrill on Grapefruit.

TABLE TENT: Honey for Breakfast gives energy for the day!

Get your Institute recipe leaflets early this year. Our most recent price list is yours for the asking. Write:

AMERICAN HONEY INSTITUTE
Commercial State Bank Building
Madison 3, Wisconsin

Cover Picture

Dr. Otto Mackensen (shown), apiculturist at the U.S.D.A. Southern States Bee Culture Station, Baton Rouge, La., prepares a swarm box to receive grafted queen cells. Such colonies must be well filled with young bees.

Apiculturists of the U. S. Dept. of Agriculture seek to develop new lines of honeybees that will produce more honey and be more resistant to diseases than any now commercially available in the U.S. Their research calls for the breeding and cross breeding of large numbers of queen bees carefully selected for the purpose.—U.S.D.A. Photo by Forsythe.

XUM

Advantages and Disadvantages of Two-Queen Colonies

CLIFFORD L. JONES, Topeka, Kansas

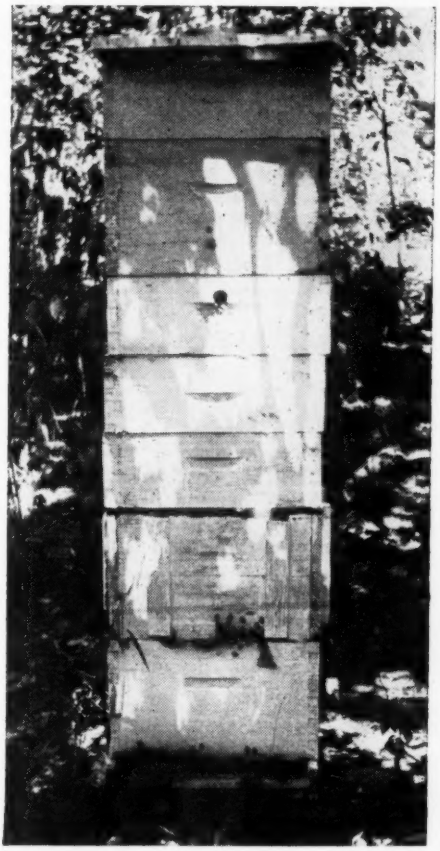
MY EXPERIENCE with two-queen colonies has been limited, yet enough to draw a few logical conclusions. First, there is no doubt that one very strong colony can store more surplus than two weaker ones with the same aggregate number of bees. Then, with two queens per colony, if anything should happen to one, the colony would continue to prosper because it still has a queen, consequently, the chances of a queenless colony are greatly reduced. There is also a saving in equipment required to produce a given quantity of surplus, due to the fact that a two-queen colony will store more than double the amount that a single-queen colony will, all other things being equal. Then, of course, only one bottom board and hive cover are required for the two-queen unit.

In some cases, there may be disadvantages to a certain extent also. The height attained by these two-queen units makes it difficult for one man to handle, although it can be done. One could not expect to manipulate a number of two-queen colonies as rapidly as he would the same number of single-queen colonies, and more time must be allowed for this. However, I believe less labor per pound of surplus is required with two-queen colonies than with single-queen colonies.

There are several methods of establishing a two-queen colony. One can divide a strong colony in the spring by either the Dunham or Farrar plan introducing a queen to the queenless portion.

Utilizing Weak Colonies

One can utilize his weak colonies for this purpose also, providing the weakness is not due to a faulty queen, or, if the queen is bad, introduce a new one. In early spring, about April 15 in this part of the country, set a weak colony over a strong colony with a separating screen between the two. A hole drilled in the hive body serves as an entrance. Stuff this with grass for a few days to prevent excessive drifting back to the old location. Heat from the strong colony will rise through the separating screen and aid the weak colony in early spring brood rearing.



A two-queen colony with surplus supers between the two units. These colonies will attain a great height during the main flow and should be wintered in at least two and a half stories.

Then in a week or two the separating screen can be removed at which time the queen in the lower unit should be confined to the lower single brood chamber with a queen excluder. Above this; two supers of drawn comb are added, then the upper brood chamber,

(Continued on page 248)

Buy and Sell

Only responsible advertisers and honest advertisements will be admitted to these columns. References required from new advertisers not known to us. Rate: 18c per counted word, each insertion. Each initial, each word in names and addresses, the shortest word such as "a" and the longest word possible for the advertiser to use, as well as any number (regardless of how many figures in it), count as one word. Copy should be in by the 10th of the month preceding publication.

HONEY FOR SALE

WE BUY AND SELL all varieties of honey. Any quantity. Write us for best prices obtainable. The Hubbard Apiaries, Onsted, Michigan.

IOWA honey, one can or truck loads. Russell D. Smalley, Beaver, Iowa.

MICHIGAN'S FINEST WHITE CLOVER HONEY. New sixties. Fully ripened. No disease. 16c and up. Sample, 20c. John McColl, Tecumseh, Michigan.

Light and amber comb honey. Abram Brubaker, Rt. 2, Lancaster, Pa.

FOR SALE — 1100 cans white honey. John Burghardt, New Ulm, Minn.

FOR SALE — 12,000 pounds 1955 crop extracted Hubam clover honey in 60's. Winkler Honey Farm, Moody, Texas.

HONEY FOR SALE: Carload, grading 17, mild. Sample sent following reasonable bid. Wayne Keller, Oshkosh, Nebr.

LIGHT CLOVER honey, fine granulated. 300 60's. G. W. Hand, Cazenovia, New York, R. D. 2.

SEVERAL choice lots top quality extracted honey, 5-gallon cans, or will pack with your label. SUPERIOR HONEY COMPANY, 4242 Elizabeth Street, Denver 16, Colorado.

FOR SALE—700 new sixties, Michigan clover honey. Sample 20 cents. Wesley Johnston, Port Hope, Michigan.

HONEY AND WAX WANTED

BEEKEEPERS TAKE NOTICE—We can not guarantee honey buyers' financial responsibility, and advise all beekeepers to sell for cash only or on C.O.D. terms except where the buyer has thoroughly established his credit with the seller.

CASH for all types extracted honey. Send sample and best price. Buckeye Honey Co., 3930 No. High St., Columbus 14, Ohio.

CASH FOR BEESWAX. Write as to quantity and we will quote price. Muench-Kreuzer Candle Co., Inc., Syracuse, N. Y.

HONEY WANTED — All grades and varieties. Highest cash prices paid. Mail samples. State quantity. HAMILTON & COMPANY, 2613 South Yates Ave., Los Angeles 22, California.

WRITE FOR Shipping tags and quotations on rendered beeswax. We buy from one pound up and if you have over 25 pounds let us work it into foundation for you at a 25 per cent saving. Walter T. Kelley Co., Clarkson, Kentucky.

HONEY WANTED, all grades in 60's. Mail samples, advise quantity, best price. A. I. Root Company of Syracuse, 1112-14 E. Erie Blvd., Syracuse, N. Y.

WANTED — White extracted or comb honey. Send sample. Millersport Honey Company, Millersport, Ohio.

BEST CASH DEAL for your honey (any grade) and beeswax Alexander Company, 819 Reynolds Road, Toledo, Ohio.

WANTED—All grades of extracted honey. Send sample and price. Deer Creek Honey Farms, London, Ohio.

BEESWAX WANTED — Highest prices paid in cash or trade for bee supplies. The A. I. Root Company, Medina, Ohio, Council Bluffs, Iowa, San Antonio, Texas.

WANTED, chunk comb and extracted honey. Mail sample and prices. Stoller Honey Farms, Latty, Ohio.

WANTED—Honey in sixty-pound cans, also beeswax, any quantity. L. E. Allen, Tipton, Mich.

CASH for Amber and Buckwheat Honey. Best cash price for wax. Hubbard, Onsted, Michigan.

WANTED: Light amber clover and fall-flowers honey, no buckwheat. Also white clover. Send sample and lowest price. Cloverdale Honey Co., Fredonia, N. Y.

FOR SALE

FOR SALE—ROYAL JELLY. Produced fresh year around. O. K. Anderson & Son, Coffee Springs, Ala.

WRITE FOR CATALOG — Quality Bee Supplies at factory prices. Prompt shipment. Satisfaction guaranteed. The Hubbard Apiaries, Manufacturers of Beekeepers' Supplies and Comb Foundation. Onsted, Michigan.

THE BIGGEST BEE SUPPLY Catalog published (64 pages) free for the asking. Listing many items not found in other Catalogs. No agents—buy direct and save 20%. WALTER T. KELLEY CO., CLARKSON, KENTUCKY.

FOR SALE — New heart cypress 10-frame bottom boards. KD., 10 or more, $1.00 each; 50 or more, 90 cents each; 100 or more, 85 cents each. One nailed up sample postpaid. $1.25. Fred L. Poole, Elizabethtown. Rt. 2, Box 67, No. Car.

FOR SALE — 8-frame Root equipment for 700-colony apiary. Write for details to E. H. Wadleigh, Monte Vista, Colo.

QUEENBEE PAINTING OUTFITS, $1.50 postpaid. Southwick Apiaries, Waban Massachusetts.

FOR SALE — Two 30-frame Woodman Radial Extractors, good as new at 25 per cent off of list price. Extractors are at Winner, S. Dak. Schmidt Honey Farms, Winner, S. Dak.

FOR SALE—80 disease free colonies in two out-yards near M53 in Lapeer County. All two-story with two extra standard hive bodies and frames. Each colony factory made with inner covers, excluders, feeders. Locations go with bees. Prairie View Honey Co., 12303 12th St., Detroit, Michigan.

FOR SALE—100 colonies of bees four stories high with winter cases and locations if desired. Homer Van Scoy, Candor, N. Y.

FOR SALE—100 hives of bees with supers, tops, and bottoms. Also selling 8-frame extractor, motor, 3-frame Novice extractor, 4 honey tanks, and uncapping equipment. T. A. GARNES, Rt. 1, CRESTON, OHIO.

FOR SALE — Several thousand once-used 60-lb. cans, 30c each; also 1500 more than once-used cans, 20c, F.O.B., River Rouge, Honeymoon Products Co., 39 East Henry St., River Rouge, Michigan.

FOR SALE—100 one and half story colonies of bees, very good shape. Harold Wilkinson, R. 5, Ashtabula, Ohio.

FOR SALE—30 colonies of bees and location, also extra hive and extracting equipment. Alan Schwartz, 9321 Broadstreet, Detroit 4, Michigan.

12-colony apiary with equipment. Write for inventory. Wm. Borsch, 118 Lakeview, Painesville, Ohio.

22 two-story Italian colonies, 23 full-depth, 57 shallow supers, 10 inner lids, 7 metal covers, and 7 bottom-boards. $340.00. Arthur C. Zuelzke, Fostoria, Ohio.

FOR SALE—40 10-frame 1½-story colonies, including extracting and comb honey equipment. Nearly all Root material in excellent condition. Clyde Baxter, Roscoe, New York.

FOR SALE—37 colonies bees and equipment. No disease. $400.00. James Milligan, Chester, Illinois.

100 10-frame colonies on titi, tupelo, gallberry locations. Also booster bees at reduced prices in your cages or new cages. A. V. Dowling, Valdosta, Ga.

HONEY WANTED

Carloads and less than carloads. Mail sample and best prices in all grades.

C. W. AEPPLER COMPANY

Oconomowoc, Wisconsin

QUEENS

ITALIANS		CAUCASIANS	
	1-24	25-99	100-up
2-lb. pkg. w/q	$3.25	$3.10	$3.00
3-lb. pkg. w/q	4.25	4.10	4.00
Nice large queens	1.05	1.00	.95

Send us your order of 1 or 1000. All orders will be shipped promptly. Only Italian bees in package with your choice of queen.

MITCHELL'S APIARIES

Bunkie, La.

Booking orders now. Over 30 years a shipper. Send for Free Circulars.

BLUE BONNET APIARIES

Weslaco, Texas

DARK ITALIANS

As GOOD As the Best

	Queens	2-lb. pkg.	3-lb. pkg.
1 to 10	$1.35	$4.00	$5.00
11 to 50	1.25	3.75	4.75
51 and up	1.15	3.50	4.50

Place your order early. The demand for good queens and packages will be larger than the supply.

WEAVER APIARIES

Navasota, Texas

HONEY LABELS

Improved designs, embodying color, balance, simplicity, and distinction. Please send for free samples & prices.

C. W. AEPPLER COMPANY

Oconomowoc, Wisconsin

Light Italians

Higher production
Gentler bees
Better service
Attractive prices

Sunrise Apiaries

Petal, Miss.

Caucasian QUEENS	1-99	Italians 100-up
2-lb. pkg. w/q	$3.35	$3.25
3-lb. pkg. w/q	4.35	4.25
Queens	1.25	1.15

CLARK'S APIARIES
Bunkie, La.

Italian Queens

EUGENE WALKER
Rt. 2, Box 207
Live Oak, California

FRAMEWORK ITALIANS
Booked to capacity on packages balance of season. Choice shipping dates available for FRAMEWORK strain Italian

QUEENS 1-24 ..... $1.00
25-99 ..... .95
100-up ..... .90

BOB GALE'S APIARIES
Box 472 Bunkie, La.

ATTENTION, PLEASE!

Booked up through April for large quantity orders of bees and queens, only small orders accepted for April shipment.

Thanks for your patronage!

O. K. ANDERSON & SON APIARIES
Phone 466 R5
Box 193 Coffee Springs, Ala.

FOR SALE—30 two-story colonies with supers. 500 wired foundation, new 20-frame extractor. Uncapping equipment. Contact Saturdays and Sundays. A. D. Anikouchine, 136 Case Road, R. D. 1, Elyria, Ohio.

BEES AND QUEENS FOR SALE

We use all possible care in accepting advertisements but we cannot be held responsible in case disease occurs among bees sold or if dissatisfaction occurs. We suggest that prospective buyers ask for a certificate of inspection as a matter of precaution.

Three and four-frame nuclei for sale, one or a truckload. Walker Apiaries, Pharr, Texas.

ITALIANS — Packages, queens. Martz, Rt. 2, Box 846, Vacaville, California.

CAUCASIANS—2-lb. package, $3.50; 3-lb. package, $4.50. Untested queens, $1.00 each; 100 for $85.00. Lewis & Tillery Bee Company, Rt. 3, Box 90, Greenville, Ala.

FOR SALE—Quality queens. Lynn Williams, Box 5760, Holly Lane, Paradise, California.

PACKAGE BEES—Take a vacation on your express money. Come for your bees; be our guest while here. 1800 hives to shake. Booking orders now. MILLER BROS., SAFFORD, ALA.

LIGHT 3-band and Carniolan bees and queens. 3 pound, $5.00; 5 pound, $7.00. Queens, $1.10, delivered price. Luther Pickett, Efland, N. C.

CARNIOLAN and CAUCASIAN queens, $1.00 each. Shipment starts April 20. I have the late Albert G. Hann strain of bees. Makes lots of white comb honey. Gentlest of all bees. Roy Waddell, Woodruff, S. C.

ITALIAN queens, $1.00 each. Shipments start April 20. Cleve Sprouse, Jr., R. 3, Woodruff, S. C.

THE NORMA ROY APIARY ITALIAN BEES. 3 pound with queen, $3.75; 4 pound with queen, $4.50. Queenless package, deduct 75c per package. Live delivery and a healthy certificate. Norma E. Roy & Son, Hessmer, Louisiana.

Dark Italian Queens, 600-pound strain, bred for production, $1.00. With 2 pounds of bees, $2.95; with 3 pounds of bees, $3.80. Henry Loehr, Caldwell, Texas.

AVAILABLE IN APRIL AND MAY FOR THE FIRST TIME, the Yankee strain. Quality queens for maximum honey production. $1.35 each until June 1st. The Stricker Apiaries, Annandale, New Jersey.

MISCELLANEOUS

"Adventures in Beekeeping." Illustrated. $2.00. Robert Oglesby, R. R. 1, Middletown, Ohio.

PLAIN or wavy-wired foundation. Beeswax rendered and purchased. Wax Workers, Ithaca, New York.

ROYALL JELLY in capsules. Each contains 10 mg. Royal Jelly, 5 mg. Vitamin B, 5 mg. Calcium Pantothenate. Boxes of 30, $1.50 to beekeepers. Retails for $3.00. Prairie View Honey Co., 12303 12th St., Detroit 6, Michigan.

HELP WANTED

WANTED — Man with some experience queen rearing. Permanent position. Hopkins Honey Farms, Maringouin, La.

WANTED—Experienced beeman, year-round work or seasonal. Possible share basis to right man. Joe Holt, 915 Winslow, Richland, Washington.

WANTED apiary and packing plant help. Experience desirable but not essential. Excellent wages, bonus, other advantages. Schultz Honey Farms, Ripon, Wisconsin.

WANTED—A good reliable man for a few months, or a permanent position for the right man. Weaver Apiaries, Navasota, Texas.

WANTED—Man to help on bee farm. Just address 410 La Belle St., Boscobel, Wisconsin.

WANTED — Experienced beekeeper to manage yard of 25 hives. Have equipment to increase. Will furnish everything in exchange for one half. Located between Owosso and Lansing. Ray Nash, 4975 Grand River Rd., Owosso, Mich.

WANTED

WANTED—Comb honey supers, 25 to 500 4¼ x 4¼ beeway. Barton, 4478 Owen Road, Linden, Michigan.

SEEDS

HONEY PLANTS our specialty. Catalog on request. Pellett Gardens, Atlantic, Iowa.

MAGAZINES

Know interesting facts concerning the bees of India through the INDIAN BEE JOURNAL, published in English by the Bhupen Apiaries (Himalayas), Ramgarrh Dist. Naini Tal, U. P. India, or available through them. Subs. Rs9/ or 15 shillings or $2.25 yearly. Sample copy post free for Rs⅛/, or s2/6, or 40 cents (International Money Order). Payment in mint postage stamps of your country accepted.

Archiv fur Bienenkunde, International journal for Bee Culture and beekeeping economics. Founded in the fall of 1918. Oldest economic bee journal in the world. Praised again and again for its decades of independent leadership through many endorsements and advice as a valuable source also for the practice. Classic. Yearly DM 5.50. Any aspiring beekeeping friend will receive a sample copy. Biene-Verglag, Giebelbach, Lindau, Germany.

BEE WORLD, the international journal of the Bee Research Association, published monthly, contains the latest research reports on bees and beekeeping. With Apicultural Abstracts it costs $3.00 per annum. Apicultural Abstracts only $1.75 per annum from the Hon. Subscription Secretary, Bee Research Association, 10 Barnett Wood Lane, ASHTEAD, Surrey, England.

Read the South African Bee Journal. Published every two months. Subscription 7/6 per year to the Treasurer, P. O. Box 3306, Cape Town, South Africa.

DO YOU FIND it difficult to secure information about sheep and sheep ranching methods? The SHEEP AND GOAT RAISER reaches more sheepmen with more information on range sheep than any other magazine published. Subscription $1.00. Hotel Cactus, San Angelo, Texas.

Have You Ordered?

It's later than you think.

Do not delay. The best service is had when orders are placed early. Give alternate date in case we cannot book as requested.

Package Prices with Rossman Regular Queens

	2 lb.	3 lb.
1-24	$4.00 ea.	$5.00 ea.
25-99	3.75 ea.	4.75 ea.
100 or more	3.50 ea.	4.50 ea.

Island Hybrid Queens add 25c ea.

"They Produce"

Mainline night shipments

Rossman Apiaries

P. O. Box 133

Moultrie, Ga.

Quality Bred Italian Queens

Breeders selected from our Michigan Apiaries for High Production and Hardiness.

Qns. through Feb. and Mar. $1.25 ea.

" " April and May, 1.00 ea.

All queens shipped Air Mail.

WALTER D. LEVERETTE APIARIES

P.O. Box 364 Ft. Pierce, Fla.

Why Not Buy the Best QUEENS!

Italians

1-25	25-100	100 up
$1.25	$1.15	$1.00

Ready to ship April 1st.
Guaranteed to please.

UNITED APIARIES

Box 276, Roxton, Texas

31 Years Experience as Queen Breeders

HOWARD WEAVER'S
Caucasian Bees & Queens

Our 1956 Prices

Quantity	1 to 9	10-48	49-up
2-lb. w/q	$4.00	$3.75	$3.50
3-lb. w/q	5.00	4.75	4.50
Queens	1.35	1.25	1.15

Book early and be assured of your favorite shipping dates.

HOWARD WEAVER
Navasota, Texas

CAUCASIAN or ITALIAN
Package Bees and Queens for 1956

Gentle bees, less swarming, good producers, health certificate and live arrival guaranteed are just a few things you get when your requirements are sent to me. No extra charges on orders booked in advance.

	1-25	25-50	50-100
2-lb. pkg. w/q	$3.70	$3.45	$3.20
3-lb. pkg. w/q	4.60	4.30	4.00
4-lb. pkg. w/q	5.50	5.15	4.80
5-lb. pkg. w/q	6.40	6.00	5.60
Queens	1.20	1.10	1.00

FARRIS HOMAN
SHANNON, MISS.

QUALITY BEES
DEPENDABLE
SERVICE

We are not the biggest shippers of package bees but we rank with the best in quality and service. Full weight, safe arrival, health certificate, and satisfaction.

34 Years as Shippers

— PRICES —	1-11	12-100
2-lb. Pkg. with queen	$3.75	$3.50
3-lb. Pkg. with queen	4.75	4.50
Untested queens	1.10	1.00
Tested queens	2.00	1.75

Package bees are shipped express F.O.B. If wanted shipped parcel post, add postage.

NORMAN BROS. APIARIES
Ramer, Ala.

PACKAGE BEES AND QUEENS
Three-banded Italians

	1 to 50	50 up
Queens	$1.10	$1.00
2-lb. pkg.	3.50	3.25
3-lb. pkg.	4.50	4.25

Live delivery guaranteed.
AUTAUGA BEE FARM
Owned and Operated by
J. H. Moody and W. L. Strength
Prattville, Ala.

SYNTHETIC BEE HIVES

(Continued from page 203)

doors an unlimited time in hot or cold, wet or dry weather. The bee building is unnecessary for protection against the weather and need only be built if one feels that it would be advantageous for other reasons. There are entirely new possibilities for moving bees. Sixty hives can be placed on a Volkswagen trailer and quickly moved to a new location.

Warns Plastic Enthusiasts

A warning to people contemplating a new hive construction is in order. Many inventors try to improve hives only to worsen living conditions for bees and to make them harder to handle when the beekeeper is working with his colonies. The hive should be built as simple as possible, to save the beekeeper's time and motion, and to make his work easier. The magazine hive in Germany is in uniform or Zander measurements, in foreign countries in Langstroth or Dadant measurements.

One can do without the double-walled hives by using artificial foam material, since there will be no more warping and cracking, which happens with wood, and since the hive can be made easily and inexpensively even without any experience or by mass production the hive will be for sale at a low price. The hive can remain out in the open in any kind of weather, in winter without packing, and is practically indestructable for an unlimited period of time. One could assume that this new type of hive will come very close to the ideal.

Carniolan
and
Caucasian

Start the New Year with young queens and be assured of plenty of bees when honeyflow starts. Carniolans and Caucasians build up rapidly, build white combs and are gentlest of all races of bees. Untested queens $1.30 each air mailed. $2.00 to foreign countries. Discount on quantity. Ready Feb. 15th. Sold out of packages for balance of season.

W. D. REAMS
LaBelle, Fla., Box 87

"Old Reliable" B E R R Y ' S Italian Bees

THE PREFERRED STOCK OF LEADING HONEY PRODUCERS

Oldest Package Shipper South — The Best in America
Age, Ability Experience Count — Sixty-One Years With The Bees
Thousands of Colonies and Nuclei — Accredited and Certified Alabama Bees

America's Best Package Bees and Finest Queens INSURE your honey crop with DEPENDABLE BERRY Bees (90% of our package bees are under 10 days old).

After 61 years of Select Breeding, we have settled on our strain of Italian bees as being unsurpassed by ANY stock, Hybrid or otherwise, in their relation to honey production, disease, and nosema resistance. We have bred repeatedly from MAJOR advertised strains, and abandoned them all as unequal to our "OLD RELIABLE" stock. "OLD RELIABLE" bees assure you that you have bought the best to be found, regardless of price. They are the Standard of the Beekeeping Profession, in leading honey producing areas. We maintain several branches in the Northwestern States that enable us to test our strain from both honey production and climatic standpoints. All this, along with Competent Breeding, assure you that when a better stock is produced, "OLD RELIABLE" will be the name.

PRICE LIST OF OUR QUEEN BEES AND PACKAGES OF BEES WITH YOUNG QUEENS

	1-24	25-99	100-up
Queens	$1.25	$1.10	$1.00
2-lb. pkg. with queen	4.00	3.75	3.50
3-lb. pkg. with queen	5.00	4.75	4.50
4-lb. pkg. with queen	6.00	5.75	5.50
5-lb. pkg. with queen	7.00	6.75	6.50

For prices on queenless packages, deduct price of queen; all prices F. O. B. Montgomery, Ala.

All our queens are selected. We have but one grade. The culls, we destroy. Only those that we would use in our own apiaries do we sell to our customers. Wings of queens are clipped free of charge on request.

Safe arrival we guarantee on everything we ship, whether packages or queens. All orders will be filled on the dot unless weather conditions are such as to make it absolutely impossible to ship. We have no disease. Our apiaries were the first in the state to be inspected and were found absolutely clean of disease. Directions telling how to handle and a Certificate of Health accompany all shipments. May we book your order NOW? Deposit of $1.00 per package required for booking. Remainder remittance in full ten days before shipping date.

References: Union Bank & Trust Co., Montgomery, Ala. Any Bee Journal in the United States or Canada. Ask your Extension Agent about us.

M. C. BERY & SON

M. C. BERRY, Pres. — CLINTON C. BERRY, Gen. Mgr.
P. O. BOX 684 — MONTGOMERY, ALABAMA

MOUNTAIN GRAY CAUCASIANS

Personally raised. Gentle good workers; winter well. Queens $1.25 each.

ELBERT S. CHILDS
201 Garden Ave. Knoxville 18, Tenn.

WHAT THE HONEYBEE BRINGS HOME

(Continued from page 214)

pollination. In a like manner the seed of many forage crops can be increased 100 per cent or more. Honeybees are the only pollinators over which man seems to have much control, and there is a direct relationship between the honeybee population and the yield of fruit and seed. It is believed that the honeybee is responsible for at least 80 per cent of all pollination produced by insects.

Still, the pollination of the flowers that produce our fruits is not a task that is conscious or planned by the bee, but results largely from a chance relationship in the search for food. The act of pollination is an accident which occurs while the bees are filling their "baskets".

WILLIAMS ITALIAN QUEENS
LARGE LEATHER-COLORED
THREE-BANDED
QUALITY SUPREME

CERTIFICATE WITH EACH SHIPMENT

1 - 9	Postpaid, Airmail	$1.00
10 -99	" "	.95
100-up	" "	.90

DR. WILLIAMS APIARIES
115 W. Sterling Ave. Baytown, Texas

1956 QUEEN BEES
3-Banded Italians

1-24 ..... $1.20 each
25 or more ..... 1.10 each

Geo. W. Moore
Shasta, Shasta Co., California

The Picture Bee Magazine

If you are taking time to read, why not read the best? Condensed to save you time. Illustrated to give you pleasure.

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A. G. Woodman Co. **Grand Rapids 4, Michigan**

ADVANTAGES AND DISADVANTAGES OF TWO-QUEEN COLONIES

(Continued from page 241)

which is the weak colony, is set on top. Bees coming up from the lower brood chamber will aid brood rearing in the upper brood chamber also. If the upper unit is much weaker than the lower one, it may be strengthened by giving it a frame of sealed brood each week from the lower unit until they are both the same strength. Soon the upper unit may need a second brood chamber. It should be added on top. The lower queen will probably get along well with a single brood chamber, as not much honey is stored there.

When the honey flow starts, the two supers between the two brood nests should not be allowed to get more than half full or the two units will act as two separate colonies and the lower brood chamber will become honey bound. When they are half full, they should be moved to the top of the pile above the upper brood chamber and replaced by empty combs. Foundation can be given during a honey flow, but it is best to have at last some drawn comb in each super. The supers may be removed from the top of the colony as soon as they are finished to prevent the colony from getting any higher than necessary. The empty combs should then be replaced between the brood nests for refilling if the flow is still on. This method follows the Farrar system with the exception of establishing the colony. This method is used to utilize those weak colonies that would otherwise probably not build up strong enough to store surplus.

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1 to 11	$4.00	$5.00	$6.00	$7.00
12 to 29	3.80	4.75	5.70	6.65
30 or more	3.60	4.50	5.40	6.30

Untested Queens, each, $1.35; Tested queens, each $2.00
If queenless bees are wanted, deduct $1.35 from the package price.
JACKSON APIARIES P.O. Box 58 FUNSTON, GEORGIA U.S.A.

What Starts the Queens Laying?

ROBERT M. MEAD, White River Jct., Vermont

THIS PAST summer I got into a good-natured argument with Lawrence Rising of Andover, N. H., about what starts off winter brood rearing. As far as I am concerned it is one of those arguments that might go on for a long time, at least until some one can convince me that he has the right answer. Mr. Rising is a small beekeeper who is very sharp about nature subjects and who has been prominent in New Hampshire association work.

I think the problem, or the subject, can be stated quite simply. As most of you know by now bees do raise brood in winter—it may be a very tiny patch, at least to start with but it is there and it is normal. I believe that at one time it was considered abnormal and most beekeepers thought that it meant the end of the colony but more thorough investigation has exploded that idea.

Now the queer thing is that this winter brood rearing starts at about the same time all over the country regardless of whether it be in the West, the South, or the North. Of course, colonies in the South, where it is warmer, have larger patches of brood than those in the North for identical dates but they both have the brood and they both start about the same time.

Now the $64,000 question is, what starts them? What is the similar factor all over the country that triggers off egg laying and signals the start of a new bee year?

Mr. Rising says that it is a disturbance, any disturbance, anything that stirs the bees up a tiny bit. I say that it is the progressively increasing length of the daylight. Actually I do not know any way of proving that either one of us is right, or perhaps wrong.

Of course, there is a basis for Mr. Rising's assumption. A colony that is disturbed very much, or that is uneasy, will start brood rearing. The reason that I am reluctant to accept his answer is that it is difficult for me to conceive of anything, any common factor that is, that disturbs the bees in Mississippi and in Iowa at the same time. Unless of course we have an army of gremlins going around kicking beehives after the first of each year.

There is a basis for my assumption also. Everything on earth that is living responds to natural phenomenon in some manner. Deer and sheep start mating after a series of fall frosts. Our northern snowshoe rabbit (hare) turns white in response to progressively shorter days and often is entirely white long before snow comes to compliment its camouflage.

We raised trout at one time and they were extremely sensitive to almost imperceptible changes in water temperature. Therefore, I reason that bees start brood rearing in response to some common factor in nature and the common factor I find most likely after the first of the year is progressively longer periods of daylight. But, frankly, I am guessing. As far as I actually know it may be Rising's gremlins or it may be atomic indigestion.

If any of you have the real answer let us have it.

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Customer acceptance is the ambition of every producer, whatever be his product.
We are elated over the ever increasing popularity of our bees and queens. However, if you are among those whose orders we have returned because of dates already taken to the total extent of our capacity, kindly accept our regrets.
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Quantities	"Starline" Hybrid Queens	"Magnolia State" Ital. Queens	2-lb. Pkgs. W/Qs	3-lb. Pkgs. W/Qs
1-24	$1.60	$1.35	$4.00	$5.00
25-99	1.50	1.25	3.75	4.75
100-up	1.40	1.15	3.50	4.50

Package prices quoted are with Italian queens.
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Bees are very prolific and extra good honey-gatherers. Please send us your order and preferred shipping dates early.

CARLUS T. HARPER
New Brockton, Ala.

LIVE AND LEARN

(Continued from page 227)

supers. Then they reduce to a single body and examine frequently for queen cells. I have tried that but it doesn't seem to work too well. It is only about one in five years that I get a fast and heavy flow that will drive the bees into the sections. And when that time comes, invariably the bees are three or four steps ahead of me on the swarming question.

If I do say it myself, I have had remarkable luck in the control of swarming in the extracted end of the business by the reversing system. My idea is that maybe I can work out a similar routine with the deep shallows that will enable me to produce some section honey that I can be proud to call my own. A lot depends on what kind of a season we are going to have. Maybe I shouldn't open up my big yap yet, but maybe somebody else with similar problems will be able to work along the same lines and report at the end of the season.

Anyhow, this is the start of the season no matter how you figure it. Come on, Sun. Get on the job and do your stuff, but don't over do it this year and dry everything up before we get a chance to try out these things.

SUE BEE SAYS:

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In order to better serve you we have ample stocks of all type bee supplies on hand. Compare our prices with what you have been paying.

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Sodium Sulfathiazole		**$ 4.50 per pound**
N. F. Powder Sulfa		**4.50 per pound**
Terramycin 5	**(2000 feedings)**	**43.00 per 50 lb. pack**
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Fumidil B	**(9.5 gram bottle)**	**24.50 per bottle**
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SUE BEE Outside White Paint		**$ 4.95 per gallon**
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Make 1956 your best year. Be among our many satisfied customers. Our Better-Bred Queens can't be beat. Order direct from this ad at the following prices:

	Queens	2-lb. w/q	3-lb. w/q
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25 up	1.15	3.50	4.50

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Extra good workers and very gentle to handle. Dadant's Starline Hybrids bred for the best of honey production.

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3-lb. pkg. with queen	4.15	4.05	3.90
Queens	1.15	1.00	.95

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Gleanings in Bee Culture
Medina, Ohio

LET'S TALK ABOUT HONEY PLANTS

(Continued from page 233)

that this evergreen shrub blooms from June 1 to July 15 in the Sierra foothills. He reports that it produces an amber honey with an odd but good flavor and a heavy body. His best surplus was 100 pounds but his average is only about 25 pounds. He usually sells the honey to bakers. Toyon is more reliable in the coast ranges than in the Sierras.

Wild cucumber (Sicyos angulatus). I published a photograph of this vine June, 1955, in this column. Since then I have obtained a pound package of wild cucumber honey in the comb from L. R. Stewart of Newport, Indiana. He told me that this species is the most important fall honey plant in his locality. The honey is extra-light amber to light amber with a yellowish tint and the comb is light but not white. The flavor is mild but quite different from clover. We found it quite satisfactory for table use. This vine grows in great abundance along river banks and on low land which overflows and also in corn fields planted in such locations. Because of the spines on the fruits, this vine is also known as bur cucumber or spiny cucumber.

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Manitoba beekeeper reports many colonies producing 400 pounds, Illinois reports record production of premium comb honey and all with "G U L F B R E E Z E" stock. Book your order NOW with us at the following prices:

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All Orders Going Out On Time

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Quantity	1-24	25-99	100 up
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5-lb. pkg. w/q	6.75	6.50	6.00
QUEENS MATED & LAYING DEL.	1.25	1.15	1.00
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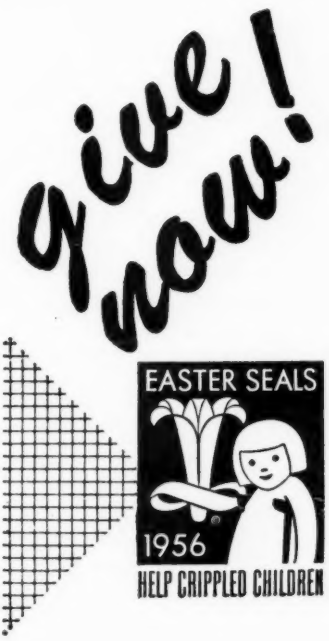

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Queens	1.35	1.25	1.15

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FOR DADANT'S IMPROVED STARLINES, add 25c each additional
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1 -24	$1.25	$1.60	$3.65	$4.60	$5.55
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100-up	1.05 air mail	3.00	4.00

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